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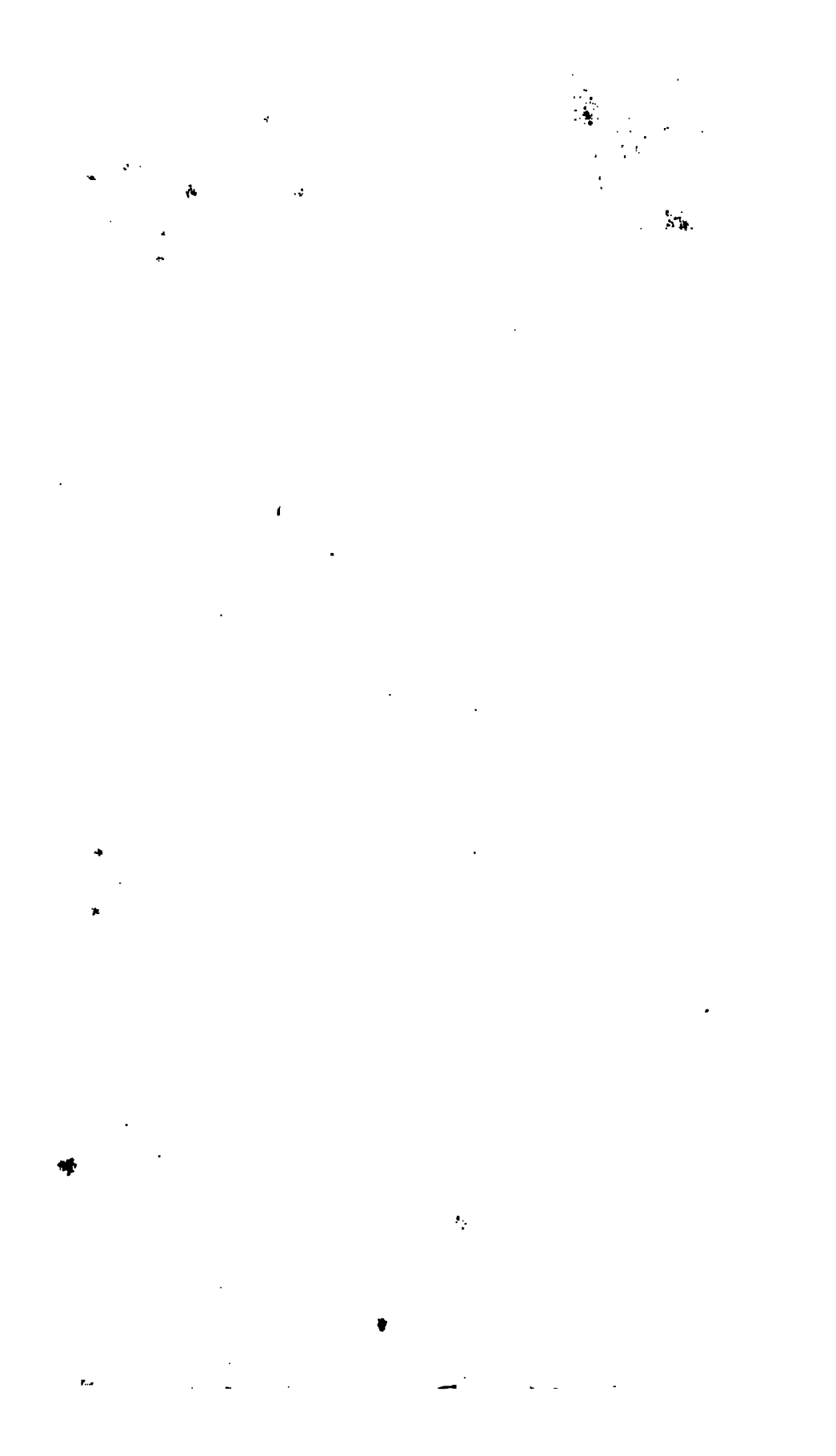


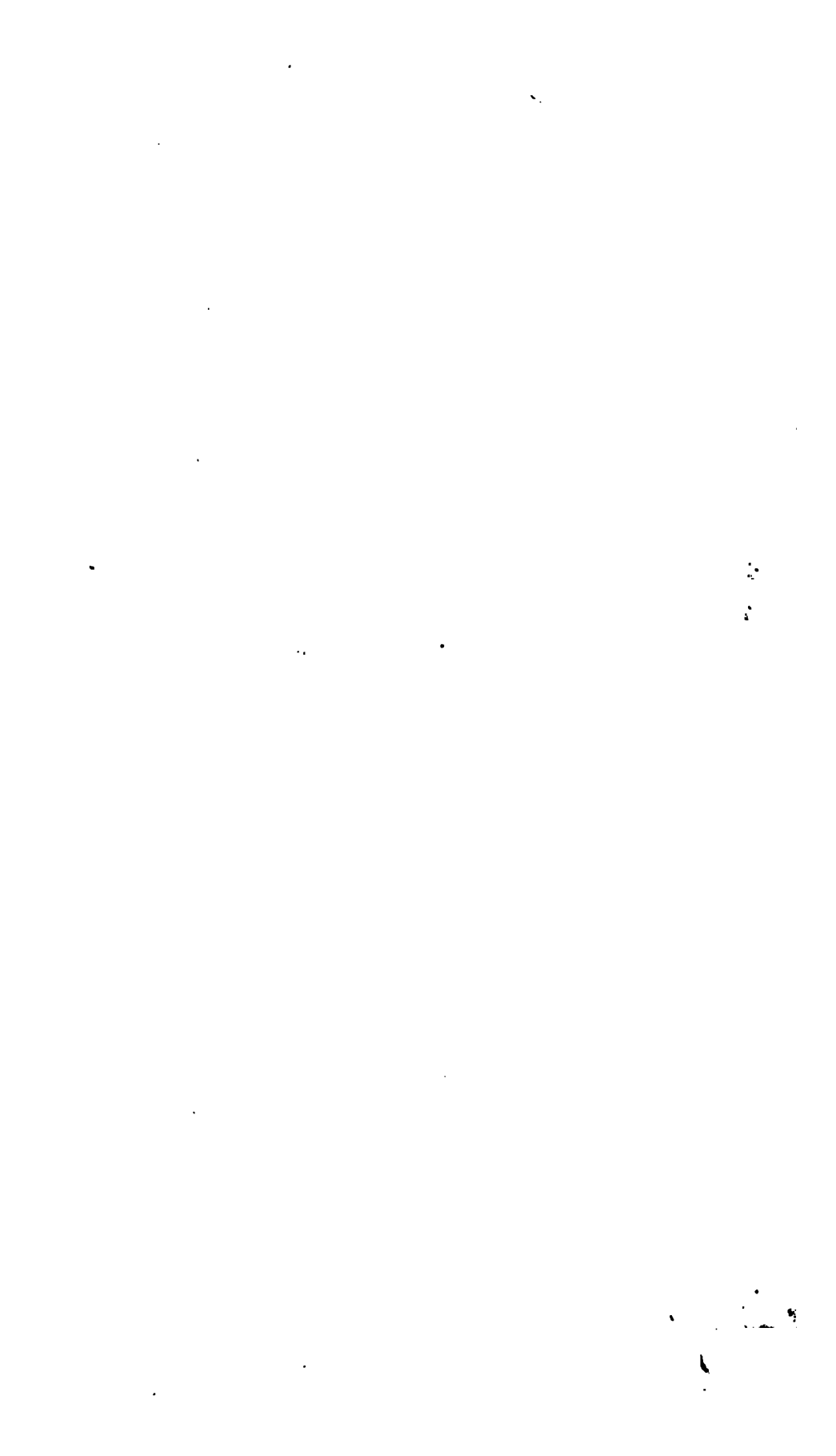
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ROBERT FULTON ESQ.

Kirk & Mercein Publishers N.York.

THE
LIFE
OF
ROBERT FULTON,

BY HIS FRIEND

CADWALLADER D. COLDEN.

Read before the Literary and Philosophical Society of New-York :

COMPRISING SOME ACCOUNT OF THE INVENTION, PROGRESS, AND
ESTABLISHMENT OF STEAM-BOATS; OF IMPROVEMENTS IN THE
CONSTRUCTION AND NAVIGATION OF CANALS, AND
OTHER OBJECTS OF PUBLIC UTILITY.

WITH AN APPENDIX.

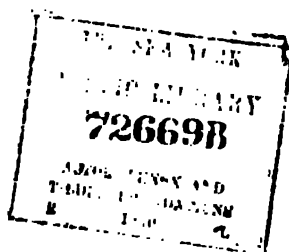
NEW-YORK :

PUBLISHED BY KIRK & MERCEIN.

NO. 22 WALL-STREET.

.....

1817.



Southern District of New-York, ss.

BE IT REMEMBERED, That on the twenty-fourth day of June, in the forty-first year of the Independence of the United States of America, Kirk & Mercein, of the said District, have deposited in this Office the title of a Book, the right whereof they claim as Proprietors, in the words following, to wit:

“The Life of Robert Fulton, by his friend Cadwallader D. Colden; read before the Literary and Philosophical Society of New-York: comprising some Account of the Invention, Progress, and Establishment of Steam-Boats; of Improvements in the Construction and Navigation of Canals, and other objects of public utility: with an Appendix.”

In conformity to the Act of the Congress of the United States, entitled “An Act for the encouragement of Learning, by securing the copies of Maps, Charts and Books to the Authors and Proprietors of such copies, during the time therein mentioned.” And also to an Act, entitled “an Act, supplementary to an Act, entitled an Act for the encouragement of Learning, by securing the copies of Maps, Charts and Books to the Authors and Proprietors of such copies, during the times therein mentioned, and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints.”

THERON RUDD, Clerk of the
Southern District of New-York.

T. & W. Mercein, Printers,
No. 93 Gold-street.

*Extract from the Minutes of the Literary and
Philosophical Society of New-York.*

LITERARY AND PHILOSOPHICAL SOCIETY
OF NEW-YORK:

March 12th, 1817.

At a Meeting of the Literary and Philosophical Society of New-York, held at their Hall, in the New-York Institution, on Thursday Evening, the 12th of March, 1817:

Resolved, That the thanks of the Society be presented to Cadwallader D. Colden, Esq. for the Biographical Memoir of Robert Fulton, Esq. deceased, delivered by him before this Society; and that Dr. Samuel L. Mitchell, the Rev. Dr. Alexander M'Leod, and Mr. John Pintard, be a Committee to present this Resolution, and to request the favour of a copy of the Memoir for publication.

New-York, March 13, 1817.

SIR,

I herewith transmit you the copy of a Resolve, passed by the Literary and Philosophical Society, at their last Meeting; and add to the request therein contained, the wish of the Committee, that the favour may be granted.

I beg you to accept the assurance
of my high esteem and regard,
SAMUEL L. MITCHILL, Chairman.
To C. D. Colden, Esq.

New-York, 17th March, 1817.

SIR,

I comply with great pleasure with the request of the Literary and Philosophical Society, which you have done me the honour to communicate to me, and I now present you with a copy of the Biography of Mr. Fulton, as I wrote it.

The materials for this Work, of which I possessed myself, afforded information which, though it would be interesting in a life of Mr. Fulton, and could not be omitted with justice to his memory, added to the Memoir much that was not calculated for an Address to be read to the Society. I therefore passed over in the reading many parts of the copy which you will now receive. I hope the performance in this shape will be acceptable to the Society. I wish it was more deserving the notice with which it is honoured.

I am, Sir, with very great
esteem and respect,

Your obedient, humble Servant,

CADWALLADER D. COLDEN.

Doctor Samuel Latham Mitchill.

Mr. Colden, on being informed of the desire of the Society to procure for publication the copy of the Biographical Memoir of our

deceased Associate, Robert Fulton, lately read before the Society, immediately and cheerfully yielded to their request.

Such was the generosity of the author, that it became expedient to inquire in what manner the proceeds of so valuable a donation should be applied. It was easy to discover that his feelings inclined him to the erection of a Monument to the honour of his Friend. The sentiment was so congenial to the wishes of the Committee, that it was instantly determined to employ all their diligence to render the design practicable.

Resolved, That the proceeds of the sale be appropriated towards the erection of a Pedestrian Statue to the honour of our deceased Associate.

Extracted from the Minutes,

JOHN W. FRANCIS, *Recording Sec'y.*

THE LIFE
OF
ROBERT FULTON;

READ BEFORE

THE LITERARY AND PHILOSOPHICAL SOCIETY OF NEW-YORK, &c.

GENTLEMEN,

IN compliance with the practice of institutions similar to our own, this Society has resolved to preserve on its records, memorials of the lives of those who have been its distinguished associates, who have contributed to its reputation and honour, by their virtues, their genius, and by the employment of their talents.

It is greatly to be lamented that the first subject for a record of this kind, should be an associate taken from us in the prime of his life, and in the midst of his usefulness;—whose virtues and manners endeared him to all who knew him, and whose loss has been lamented as a public calamity.

We cannot think that it will be imputed to an undue partiality for our regretted associate, if we say that there cannot be found on the records of departed worth, the name of a person to whose individual exertions mankind are more indebted than they are to the late Robert Fulton. The combined efforts of philosophers and statesmen have improved the condition of man; but no individual has conferred more important benefits on his species than he whose memory now engages our attention.

When we have taken a view of what he has done, and bestowed some consideration on its effects, it will not appear that this praise is exaggerated, and we shall be obliged to acknowledge that though others may have been conducted in the paths of science by superior learning, and may have had a more dazzling career, the labours of no individual have been more honourable, meritorious, or practically useful.

The establishment of steam navigation will form an important epoch in the history of our species.—The name of the man who accomplished it will live to the remotest ages, if he be not robbed of the fame which is due to the employment of a superior genius, with surprising courage, industry, perseverance, and success.

If the construction of a bridge, or the formation of a canal, has often given a celebrity which has been transmitted through many ages, what fame and what gratitude does not he deserve, who has furnished a means of transportation which may bring the inhabitants of the world nearer to each other than previously subjects of the same territory considered themselves; which will spread with a facility before unknown the influence of religion, civilization, and the arts; which will bring the whole human species to an intimate acquaintance with each other; and will unite mankind by the bonds of mutual intercourse. This is not the only, nor per-

haps the most important view which may be taken of this invention. If the anticipations of our deceased associate should be realized; if the art of steam navigation should make a progress at all commensurate with its improvement while it felt the influence of his genius, it may so far change the character and nature of warfare, that naval conflicts will be at an end, or will be confined to the high seas. Should this be its happy effects, each nation, when its coasts and harbours may be protected by a force which will defy all maritime assaults, will feel itself independent; no nation will dare to call herself mistress of the ocean, and the world will no longer be vexed and disturbed by power derived from naval armaments. No longer will the citizens of one nation, when borne on that element which nature has spread out in every direction for the common benefit, be exposed to the insults or lawless power of another; but the great deep will be the common highway, free for all.

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It was such expanded views and philanthropic sentiments as these, that awakened the genius, excited the industry, and encouraged the perseverance of Fulton.—They were not only connected with his inventions for the application of steam, but we shall see that they gave birth in his fruitful mind, to many projects, which had the same objects. These, though they have not been matured in his lifetime, may want only such talents as his were to bring them into successful operation.

But I must not forget that I am not at liberty to indulge my feelings on this occasion, by pronouncing merely a panegyric on my departed friend. It is my duty to submit to the society some account of his life.

No duty could be more grateful to my feelings than this, did I feel any confidence that I shall discharge it with justice to him or credit to myself. It will too plainly appear, I fear, that I have wanted the necessary materials for writing such a Biography as may

naturally be expected on such an occasion. Till Mr. Fulton commenced his experiments on steam navigation, after his return to this country, in the year 1806, few memorials are to be found of him, other than such as tend to show the activity and employments of his mind.

- From that time, he was almost exclusively occupied in the prosecution of those discoveries which were the offspring of his genius: and some history of these will be the most interesting part of this memoir.

Robert Fulton was born in the town of Little Britain, in the county of Lancaster, and state of Pennsylvania, in the year seventeen hundred and sixty-five; he was of a respectable though not opulent family. His father, Robert Fulton, was a native of Kilkenny, in Ireland. His mother was also of a respectable Irish family, by the name of Smith, established in Pennsylvania.

Robert Fulton, the father, died in seventeen hundred and sixty-eight, and was buried in the cemetery of the first Presbyterian church erected in Lancaster, of which he was one of the founders.

The mother died in seventeen hundred and ninety-nine, on a small farm in Washington County, Pennsylvania, which had been purchased for her by her son Robert, in the year seventeen hundred and eighty-six. This farm he owned at the time of his death, and left it by his will to one of his sisters.

Robert Fulton, the father, and Mary his wife, had five children, three daughters and two sons. Robert was their third child and oldest son.

His patrimony was very small; "he was fond," says one of his intimate friends, "of letting this be known, and was desirous of being considered, as he really was, the maker of his own fortune."

In his infancy he was put to school in Lancaster, in Pennsylvania, where he acquired the rudiments of a common English education.

His peculiar genius manifested itself at a very early age. In his childhood, all his hours of recreation were passed in the shops of mechanics, or in the employment of his pencil; and at this early period of his life he had no other desire for money than to supply himself with the necessary materials to indulge his taste for mechanism and drawing.

By the time he had attained the age of seventeen years, he became so much an artist with his pencil, as to derive emolument from painting portraits and landscapes, in Philadelphia, where he remained till he was about twenty-one. In this time he had made the acquaintance of our celebrated countryman Doctor Franklin, by whom he was much noticed.

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When he came of age he went to Washington County, and there purchased with the means he had acquired in Philadelphia, the little farm on which he settled his mother. After seeing his parent comfortably established in the home which he had provided for her, he sat out with an intention of returning to Philadelphia.—In his way, he visited the warm springs of Pennsylvania, where he met with some gentlemen, who were so much pleased with the genius which they discovered in his paintings, that they advised him to go to England, where they assured him he would meet with the patronage of his countryman, Mr. West, who had even then attained great celebrity in that art, in which he has since been unrivalled.

Allured by these prospects, he left his native country, and arrived in England in the same year.

His reception by Mr. West, was such as he had been led to expect. That distinguished

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American was so pleased with his promising and enterprising genius, and his many amiable qualities, that he took him into his house, where he continued an inmate for several years.

When Mr. Fulton returned to this country, he brought with him a family piece representing that great artist and his lady, done by Mr. West himself; who also painted a portrait of Mr. Fulton, which his family now possesses:—These pieces were offerings of friendship, and were made and received as tokens of the attachment formed between the family of that great painter and his young friend at an early day, and which lasted until his death.

After leaving that family, he appears for some time to have made the art in which he had had the benefit of the instructions of that great master, his chief employment. He spent two years in Devonshire, near Exeter, where he made many respectable acquaintances, and among others he

became known to the Duke of Bridgewater, so famous for his canals, and Lord Stanhope, a nobleman celebrated for his love of science, and particularly for his attachment to the mechanic arts. Mr. Fulton was for a long time in correspondence with Lord Stanhope, and they communicated to each other, ideas on subjects to which their minds were mutually directed.

In seventeen hundred and ninety-three, we find Mr. Fulton actively engaged in a project to improve inland navigation: even at that early day, he had conceived the idea of propelling vessels by steam; and he speaks in some of his manuscripts with great confidence of its practicability. In May, seventeen hundred and ninety-four, he obtained from the British government, a patent for a double inclined plane, to be used for transportation. An account of this patent and a description of the invention may be seen in the seventeenth volume of the Repertory of Arts.

What were Mr. Fulton's principal pursuits, or occupations for some years subsequent to this period, does not appear. In his preface to a description of his Nautilus, which we shall hereafter notice, he says, that he had resided eighteen months in the great manufacturing town of Birmingham; and there, among the men who are described by an English author as having green hair and red eyes, he must have acquired some of that practical knowledge in mechanics, which he made so useful to his country, and indeed to the world. In eighteen hundred and four, when Mr. Fulton left Paris, he sent a large collection of his manuscripts to this country. The vessel in which they were embarked was wrecked. The case containing them, after having been some time in the sea, was recovered, but most of its contents were destroyed; and most of his papers which have relation to that part of his life which he spent in Europe, and to which we have now recourse, bear the marks of this accident. Many of them are greatly obliterated. But

though they are only fragments, they mark the genius of a Fulton, and increase our regret that any production of his strong and very original mind, which he thought worth preserving, should be lost.

It is owing to this misfortune, that we have so few traces of Mr. Fulton's occupations at this period of his life. But a mind like his could never be idle, and we find that at this time it was directed to his favourite pursuits. In seventeen hundred and ninety-four, he submitted to the British Society for the Promotion of Arts and Commerce, an improvement of his invention on mills for sawing marble, for which he received the thanks of the society and an honorary medal. He also about this time, as is presumed, invented a machine for spinning flax, and another for making ropes. For these he obtained patents from the British government. A mechanical contrivance for scooping out the earth, in certain situations, to form the channels for canals

or aqueducts, which, as it is understood, is now in use in England, is also his invention.

Indeed the subject of canals appears chiefly to have engaged his attention about this time. He now, and probably for some time previously, professed himself a civil engineer. Under this title, he published his work on canals. In seventeen hundred and ninety-five, he published some essays on the same subject in the London Morning Star.

In the introduction to his Treatise on Canal Navigation, he says, that his thoughts were first turned to this subject by reading a paper descriptive of a canal proposed by the earl of Stanhope. In the spring of seventeen hundred and ninety-six, he published in London his Treatise on the Improvement of Canal Navigation. The object of this work was to prove that small canals, navigated by boats of little burden, were preferable to canals and vessels of the dimensions then in

use, and to recommend a mode of conveyance over mountainous countries, independent of locks, rail-ways, and steam-engines. This he proposed to accomplish by inclined planes, upon which vessels navigating the canal, of a construction adapted to his plan, and their cargoes, should be raised and lowered from one level to another, or by lifting or lowering the boat and her freight perpendicularly by machinery of very ingenious construction placed on the higher level. This was to be moved by the power of water taken from the superior height and applied to a water-wheel; or by the weight of a body of water received into a coffer, which was to move in a direct line between the higher and the lower level, through a perpendicular shaft or well made in the earth for the purpose. He also proposed, by a different modification of his machinery, and by, what he calls, double inclined planes, to accomplish the passage over a valley, from one summit to another.

He does not pretend that to use inclined planes for these purposes was an original thought of his ; but their connexion with machinery, as he suggests, and particularly the perpendicular lift he claimed as his invention.

Before he published this work, he submitted his plan with models of his machines to the British Board of Agriculture, of which Sir John Sinclair was then president. It was favourably received and strongly recommended by a resolution of the Board, which was communicated to Mr. Fulton in a very complimentary manner.

In this work the author does not confine himself to a mere description of his invention or machinery. He takes an extensive view of canal navigation as connected with political economy. He enters into calculations of the expense, advantages, and profit of the mode of conveyance which he proposes, in contrast with those which had been

before used, and by doing so, presents a body of information, which in itself is highly useful and interesting, and must be particularly so to us, now that the eyes of the community seem to be opening to the very extraordinary natural advantages which our country affords, for the most extensive and most magnificent inland navigation in the world.

It would not be right to omit noticing that the work of which we have been speaking, is not confined to canals. These are so nearly connected with aqueducts and with bridges, that he bestows some chapters, containing new ideas and valuable information, on these objects.

Mr. Fulton throughout his course as a mechanist and civil engineer, derived great advantage from his talent for drawing and painting. He was an elegant and accurate draftsman. Of his abilities in this important branch of his profession, the plates annexed to the work we have mentioned, afford strong

proof. This gave him great facility in causing his designs to be executed, and a great advantage over most who have engaged in similar pursuits. After his attention became directed to mechanics, he seems not to have used his pencil as a painter, till a short time before his death, when he resumed it to paint some portraits of his own family. These remain evidences of his high attainments in this branch of the fine arts, and in times to come, they will not only be valued as the works of an artist, but as the productions of a man so celebrated. Mr. Fulton was himself much pleased with his success in making these pictures, and has mentioned it as a proof of the advantage to be derived from studying the performances of the great masters. He found, he said, that though he had not attempted to paint for many years, these amateur productions were better than any thing he had formerly done ; and he imputed this superiority to the knowledge he had acquired during his residence in Paris,

from the celebrated pieces which were assembled in the Louvre.

It is gratifying to find, that Mr. Fulton ever felt as an American. His long residence abroad did not enfeeble his attachment to his country. Thoughts of her prosperity and welfare were connected with all his projects, and those that he thought might be of advantage to her, he communicated with a promptness and disinterestedness which marked his desire to serve her. With his Treatise on Canals, he published a letter to the governor of his native state, in which he illustrates the advantages of forming interior communications by canals, rather than by turnpike-roads; and recommends his own system of small canals and boats, as being preferable to the method of canalling then in use in Europe:—With the same views he sent a copy of his work to General Washington, from whom he received in return a flattering acknowledgment.

Mr. Fulton obtained a patent for canal improvements from the British government, and then went to France with the design of introducing them there, and of obtaining the patent-right for them, which was afterwards granted to him by its government. Though his mind soon after his arrival there, became directed to other very interesting and important objects, his canal system continued to be a favourite one, and to engage a portion of his attention.

In the spring of seventeen hundred and ninety-eight, he addressed two letters on this and other subjects to Lord Stanhope. They have the following title: "Letters from Robert Fulton, to the Right Honourable the Earl of Stanhope, explaining the present projects of the government of France, their plans of aggrandizement, their system of acquiring revenues, and their views with regard to foreign possessions and trade." These are rather essays than letters, and were evidently intended for the press; but whether they were

ever published we do not know. In a confidential letter to Lord Stanhope, he tells him that the title sounds high : that he had adopted it to excite curiosity, and to induce the people of England to read them, and to awaken their minds to the advantages of canals, home improvements, simple taxation, and free trade. In this letter he makes another disclosure, which shows how constantly his country was in his mind, and how intimately her prosperity was connected with all his projects. He acknowledges to Lord Stanhope, that his principal reason for wishing these letters to be printed, was that a knowledge of them might precede his return to America, which he then contemplated ; and where he intended, as he informed his lordship, to use all his influence to induce his countrymen to adopt the systems of which his letters point out the advantages.

It seems to be at about this time that he wrote a work which is found among his manuscripts, and which probably was designed

to have an influence on the great political questions which were then agitated in France. It is addressed "to the friends of mankind," and is intended to enforce on the French legislators, the duty of providing for education, and of attending to interior improvements, upon which he maintains that the happiness of a nation, and more particularly of a republic, most essentially depends; or to express his sentiments in his own words, he says, "the whole interior arrangements of governments should be to promote and diffuse knowledge and industry. Their whole exterior negotiations to establish a social intercourse with each other, and to give a free circulation to the whole produce of virtuous industry."—An universal free trade is his favourite theory in political economy, and one which he loses no opportunity of advocating with all the force of his ardent mind.

He considers what he calls the war system of the old world, as the cause of the

misery of the greatest portion of its inhabitants, and this leads him into a curious investigation of its effects, as well as an interesting enumeration of the inhabitants of Europe. These he classes as *producers* and *idlers*;—of the numbers of each of these he gives an estimate, and then presents a variety of calculations, to show what are the effects of the last upon the society they incur.

This work, like every thing that came from the pen of Mr. Fulton, is written with great natural strength and originality. He never attempts to borrow either ideas or ornament; but is content to express the conceptions of his own mind with force and perspicuity.

There is also among his manuscripts, another volume on the same subject. It is entitled, “Thoughts on Free Trade, with reasons why foreign possessions, and all duties on importations, are injurious to nations.” It is written with great animation and force.

It is addressed to the French executive directory, and bears date the ninth of October, seventeen hundred and ninety-seven.

Ardour and perseverance were characters of Mr. Fulton's mind; when he had conceived what he thought a practicable and beneficial project, he left no means untried, and spared no pains for its accomplishment. In seventeen hundred and ninety-seven, Lord Malmsbury was at Lisle, proposing terms of peace between England and France. Fulton thought this a favourable opportunity to urge upon those who had power to carry them into execution, his ideas on the liberty of commerce and the freedom of navigation. He had an intimate acquaintance with Carnot, who was then a member of the executive directory, and who he had reason to think would listen to his suggestions. He entered into a correspondence with Carnot on this subject, urging him to avail himself of this opportunity to establish a theory, which if put in practice, would, in Mr. Fulton's

opinion, so much better the condition of mankind. But the revolution of the eighteenth Fructidor arrived, and Carnot was obliged to seek safety in flight. Mr. Fulton afterwards communicated his thoughts on this subject to the new directory; they did not, however, suit the dispositions of the new governors, and were unnoticed.

“After this,” says Mr. Fulton in one of his manuscripts, “I was convinced that society must pass through ages of progressive improvement, before the freedom of the seas could be established by an agreement of nations, that it was for the true interest of the whole:—I saw that the growing wealth and commerce, and the increasing population of the United States, would compel them to look for a protection by sea, and perhaps drive them to the necessity of resorting to European measures, by establishing a navy. Seeing this, I turned my whole attention to find out means of destroying such engines of oppression, by some method

which would put it out of the power of any nation to maintain such a system, and would compel every government to adopt the simple principles of education, industry, and a free circulation of its produce."

Out of such enlarged and philanthropic views and reflections, grew Mr. Fulton's inventions for submarine navigation and explosions; and with such patriotic motives did he prosecute them.

Of these inventions some account will now be given.

In the year seventeen hundred and ninety-seven, he took his lodgings in Paris, at an hotel in which Mr. Joel Barlow, our celebrated countryman, and his lady had their residence. "Here," to use the warm language of one who participated in the sentiments expressed, "commenced that strong affection, that devoted attachment, that real friendship, which subsisted in a most extraor-

dinary degree between Mr. Barlow and Mr. Fulton during their lives. Soon after Mr. Fulton's arrival in Paris, Mr. Barlow removed to his own hotel, and invited Mr. Fulton to reside with him. Mr. Fulton lived seven years in Mr. Barlow's family, during which time he learnt the French, and something of the Italian and German languages. He also studied the high mathematics, physics, chymistry, and perspective, and acquired that science, which when united with his uncommon natural genius, gave him so great a superiority over many of those who with some talents, but without any sort of science, have pretended to be his rivals. Mr. Fulton, during his residence with Mr. Barlow, projected the first panorama that was exhibited in Paris. This was a novelty which attracted many spectators, and afforded a handsome emolument."

In December, seventeen hundred and ninety-seven, he made an experiment, in company with Mr. Barlow, on the Seine, with a machine which he had constructed,

and by which he designed to impart to carcasses of gunpowder a progressive motion under water, to a given point, and there to explode them. But he was disappointed in the performance of this machine.

He continued, however, to employ his mind and talents on this subject, and to make a variety of experiments with a view to the accomplishment of his object, of which experiments very interesting particulars are preserved among his papers, until he had perfected the plan for his submarine boat as it was afterwards executed.

A want of funds to enable him to carry his design into execution, induced him to apply to the French directory. They at first gave him great reason to expect their countenance and encouragement; but after a long and irksome attendance at the public offices, to his great surprise and disappointment, he received a note from the minister of war, informing him that the directory had totally ejected his plan.

Mr. Fulton was never to be discouraged. He thought that the directory might be induced to change their opinions, or that there might be, as there had been, a change in the executive. With these hopes, he executed a handsome model of his machine; and a change having taken place as to one of the members of the directory, he again presented his plan; and on the 13th Thermidor, in the year six, a commission was appointed to examine his pretensions. This commission made a very favourable report; but after another three months attendance on the minister of the marine, Mr. Fulton was again greatly disappointed to learn that his plan was entirely rejected.

Not yet discouraged, he offered his project to the Dutch government, through Mr. Schemelpeninck, who was then at Paris as ambassador from Holland. A commissioner was in consequence appointed by the executive directory of the Batavian republic, to examine his models; but he met with

another disappointment. The commissioners spoke so luke-warmly of his propositions, that the Dutch government would not give him sufficient encouragement. An individual, however, of that nation, Mr. Vanstaphast, furnished him with the necessary funds, and he proceeded to construct his machine. When it was nearly complete, he again addressed the Dutch minister, who appears to have been personally friendly to his plan. Mr. Fulton pressed upon him the advantages which his nation might derive from adopting submarine navigation; neither these letters, however, nor others, which he addressed at the same time to the Batavian executive, appear to have had any success.

But the French government changed. Bonaparte placed himself at the head of it, with the title of First Consul.

Mr. Fulton soon presented an address to him, soliciting him to patronise the project for submarine navigation, and praying him to

appoint a commission, with sufficient funds and powers to give the necessary assistance. This request was immediately granted, and the citizens Volney, La Place, and Monge were named the commissioners.

In the spring of the year eighteen hundred and one, Mr. Fulton repaired to Brest, to make experiments with the plunging boat he had constructed the preceding winter. This, as he says, had many imperfections, natural to a first machine of such complicated combinations. Added to this, it had suffered much injury from rust, in consequence of his having been obliged to use iron instead of brass or copper, for bolts and arbours.

Notwithstanding these disadvantages, he engaged in a course of experiments with the machine, which required no less courage than energy and perseverance. Of his proceedings, he made a report to the committee appointed by the French executive; from

which report we learn the following interesting facts:

On the third of July, eighteen hundred and one, he embarked with three companions on board his plunging boat in the harbour of Brest, and descended in it to the depth of five, ten, fifteen, and so to twenty-five feet; but he did not attempt to go lower, because he found that his imperfect machine would not bear the pressure of a greater depth. He remained below the surface one hour. During this time they were in utter darkness. Afterwards he descended with candles; but finding a great disadvantage from their consumption of vital air, he caused previously to his next experiment, a small window of thick glass to be made near the bow of his boat, and he again descended with her on the twenty-fourth of July, eighteen hundred and one. He found that he received from his window, or rather aperture covered with glass, for it was no more than an inch and a half in diameter, sufficient light to enable him to

count the minutes on his watch. Having satisfied himself that he could have sufficient light when under water ; that he could do without a supply of fresh air for a considerable time ; that he could descend to any depth, and rise to the surface with facility ; his next object was to try her movements, as well on the surface as beneath it. On the twenty-sixth of July, he weighed his anchor and hoisted his sails : his boat had one mast, a mainsail, and jib. There was only a light breeze, and therefore she did not move on the surface at more than the rate of two miles an hour ; but it was found that she would tack and steer, and sail on a wind or before it, as well as any common sailing-boat. He then struck her mast and sails ; to do which, and perfectly to prepare the boat for plunging, required about two minutes. Having plunged to a certain depth, he placed two men at the engine, which was intended to give her progressive motion, and one at the helm, while he, with a barometer before him, governed the machine, which kept her

balanced between the upper and lower waters. He found that with the exertion of one hand only, he could keep her at any depth he pleased. The propelling engine was then put in motion, and he found upon coming to the surface, that he had, in about seven minutes, made a progress of four hundred meters, or about five hundred yards. He then again plunged, turned her round while under water, and returned to near the place he began to move from. He repeated his experiments several days successively, until he became familiar with the operation of the machinery, and the movements of the boat. He found that she was as obedient to her helm under water, as any boat could be on the surface ; and that the magnetic needle traversed as well in the one situation as the other.

On the seventh of August, Mr. Fulton again descended with a store of atmospheric air compressed into a copper globe of a cubic foot capacity, into which, two hundred

atmospheres were forced. Thus prepared he descended with three companions to the depth of about five feet. At the expiration of an hour and forty minutes, he began to take small supplies of *pure* air from his reservoir, and did so as he found occasion, for four hours and twenty minutes. At the expiration of this time he came to the surface, without having experienced any inconvenience from having been so long under water.

Mr. Fulton was highly satisfied with the success of these experiments; it determined him to attempt to try the effects of these inventions on the English ships, which were then blockading the coast of France, and were daily near the harbour of Brest.

His boat at this time he called the submarine boat, or the plunging boat; he afterwards gave it the name of the Nautilus: connected with this machine, were what he then called submarine bombs, to which he

has since given the name of Torpedoes. This invention preceded the Nautilus. It was, indeed, his desire of discovering the means of applying his torpedoes, that turned his thoughts to a submarine boat. Satisfied with the performance of his boat, his next object was to make some experiments with the torpedoes. A small shallop was anchored in the roads, with a bomb containing about twenty pounds of powder; he approached to within about two hundred yards of the anchored vessel, struck her with the torpedo and blew her into atoms. A column of water and fragments was blown from eighty to one hundred feet in the air. This experiment was made in the presence of the prefect of the department, Admiral Villaret, and a multitude of spectators.

St. Aubin, a member of the tribunate, gives in the Journal of Commerce of the 20th of January, 1802, an account of a submarine boat, which he says Mr. Fulton was then con-

structing. In this, however, there is a mistake. Mr. Fulton had projected another boat of this description upon a larger and an improved plan; but he had not the means of executing it, and all his experiments were made with the small boat he first constructed, and which, as we have before remarked, he found at the end of the winter much impaired by the rusting of some parts of the machinery. St. Aubin's account is as follows: "The diving boat, in the construction of which he is now employed, will be capacious enough to contain eight men, and provision enough for twenty days, and will be of sufficient strength and power to enable him to plunge one hundred feet under water, if necessary. He has contrived a reservoir of air, which will enable eight men to remain under water eight hours. When the boat is above water, it has two sails, and looks just like a common boat; when she is to dive, the mast and sails are struck.

“ In making his experiments, Mr. Fulton not only remained a whole hour under water with three of his companions, but had the boat parallel to the horizon at any given distance. He proved that the compass points as correctly under water as on the surface, and that while under water, the boat made way at the rate of half a league an hour, by means contrived for that purpose.

“ It is not twenty years,” continues St. Aubin, “ since all Europe was astonished at the first ascension of men in balloons: perhaps in a few years they will not be less surprised to see a flotilla of diving boats, which, on a given signal, shall, to avoid the pursuit of an enemy, plunge under water, and rise again several leagues from the place where they descended !

“ The invention of balloons has hitherto been of no advantage, because no means

have been found to direct their course. But if such means could be discovered, what would become of camps, cannon, fortresses, and the whole art of war."

" But if we have not succeeded in steering the balloon, and even were it impossible to attain that object, the case is different with the diving boat, which can be conducted under water in the same manner as upon the surface. It has the advantage of sailing like the common boat, and also of diving when it is pursued. With these qualities, it is fit for carrying secret orders, to succour a blockaded fort, and to examine the force and position of an enemy in their harbours. These are sure and evident benefits which the diving boat at present promises. But who can see all the consequences of this discovery, or the improvements of which it is susceptible? Mr. Fulton has already added to his boat a machine, by means of which he blew up a large boat in the port of Brest, and if by future experiments, the same effect

could be produced in frigates or ships of the line, what will become of maritime wars, and where will sailors be found to man ships of war, when it is a physical certainty that they may at every moment be blown into the air by means of diving boats, against which no human foresight can guard them."

Through the summer of eighteen hundred and one, and till the project was relinquished on account of the season, Mr. Fulton appears to have been watching the English ships which were on the coast; but though some of them daily approached off the harbour, yet none came so near, or anchored in such a situation, as to be exposed to the effects of his attempts. In one instance, he came very near a British seventy-four; but she just in time made such a change of position as to save herself.

The rulers of France were discouraged by this want of success, or rather by this want of opportunity; and so far from being will-

ing to make further advances for new experiments or efforts, the French ministers showed a disposition not to fulfil their engagements with Mr. Fulton. The escape of the enemy's vessels, seems to have lowered his inventions so much in the estimation of the officers of the French government, that they never again could be induced to give them any encouragement. The English were not without some information as to these extraordinary attempts which their enemies were making; and however the French may have thought of Mr. Fulton's projects, they certainly occasioned some uneasiness in England. Lord Stanhope spoke of them with great anxiety in the house of Lords. In 1803, he formed an association of gentlemen, for the purpose of procuring information as to the progress of Mr. Fulton's designs, and what might be their consequences. This association made a report to the then British minister, Lord Sidmouth, and this led to a communication from him to Mr. Fulton; the object of which was to

deprive France of the benefit of his inventions and services, and give England the advantage of them, by inducing him to withdraw from France.

Many have thought that consistency and morality did not leave Mr. Fulton at liberty to listen to these proposals. That as a citizen of a neutral country, he should not have intermeddled in the quarrel between France and England; but, that having once acted with France in hostility to England, he could not afterwards take the opposite side, and in the same war, throw what he thought a decisive weight into the scale of England against France.

Mr. Fulton was not unconscious that if he accepted the offers of England, he might be exposed to censure; but he persuaded himself, that when his motives and the principles by which he was governed were understood and rightly considered, his conduct in yielding to the overtures of the British go-

vernment; would not only be thought excusable, but justifiable and even meritorious.

It must be recollected, that Mr. Fulton's enthusiastic notions of the advantages of an universal free trade and the liberty of the seas, had led to the inventions which he was then endeavouring to employ, and which, as he supposed, would annihilate naval armaments, the great support in his estimation of what he called the war system of Europe. He was persuaded, that if this system could be broken up, all nations would direct their energies to education, the sciences, and a free exchange of their natural advantages. He was convinced, that if, on the contrary, the Europeans continued to cherish this war system, and to support and augment their great naval armaments, his own country would be driven to the necessity of protecting herself by similar establishments, which, as he thought, would be inimical to her republican institutions, and destructive of her happiness. Without reference, therefore, to

the merits of the then existing contest, the grounds of which were constantly changing; without feeling a partiality or enmity to either of the belligerents; he was desirous of engaging one of the nations at war, to give him an opportunity of trying the efficacy of his inventions. If they were proved to answer his expectations, he was indifferent as to the temporary advantage it might give either over the other. He believed that the result would be the permanent happiness of all, and that in the general good, his own country would largely participate. He considered himself as introducing a new military science, which he wished to prove, and in which he had a desire to perfect himself for the benefit of his country, and of mankind. His sentiments on this subject were not novel, nor without the sanction of the nations which they most immediately concerned. Neither France or England has hesitated to encourage their citizens, with a view to their improvement in military science, to serve in the armies and

navies of foreign states at war, when they have been neutral.

Whatever may be the just force of this reasoning, it swayed the mind of Mr. Fulton to an honest conviction. He acted under a full belief, that after the French government had abandoned his projects, he was justifiable in submitting them to those who promised to give them a fair experiment. This is evinced by the openness and candour with which he acted, when he found that he must relinquish all hopes of support from the French government, and that they refused to furnish him with the means of prosecuting his enterprises; he openly avowed to them, that he would make proposals to the English: and when that nation engaged his services, they knew well what he had been doing in France. They perfectly understood from him, that he was not about to join them as a partisan; but that his object was to try in practice, a theory, which, if it were just, they must have seen, notwithstanding any temporary advantages

which it might give them, must eventually put an end to that maritime superiority, with which they were contending for the dominion of the eastern world.

In all Mr. Fulton's negotiations with the British government, he presented himself in this view; and when it was proposed that he should, for a considerable reward, suppress his inventions, so that they might be buried, and that neither his own country or the rest of the world could derive from them those advantages which he thought they would afford, he indignantly rejected the overture. This will appear from his written communications with the British ministry, extracts from which we shall now present, though by doing so, the order of events will be a little anticipated.

In a paper which Mr. Fulton read to certain gentlemen, who were appointed by the British ministry in the month of August, eighteen hundred and six, to confer with

him, he says, "at all events, whatever may be your award, I never will consent to let these inventions lie dormant should my country at any time have need of them. Were you to grant me an annuity of twenty thousand pounds a-year, I would sacrifice all to the safety and independence of my country."

He concludes a letter to Lord Grenville in the following words: "It never has been my intention to hide these inventions from the world on any consideration. On the contrary, it ever has been my intention to make them public as soon as may be consistent with strict justice to all with whom I am concerned. For myself, I have ever considered the interest of America, free commerce, the interest of mankind, the magnitude of the object in view, and the rational reputation connected with it, superior to all calculations of a pecuniary nature." These are the sentiments of a man who had confidence in the rectitude of his conduct. It is very possible, that Mr. Fulton, on withdrawing from France,

was also in some measure influenced by an aversion to the new character which the government assumed, after the accession of Napoleon to the consular dignity.

In a letter to Lord Melville, Mr. Fulton expresses himself as follows: "There is no project flattering to vanity, which is too extravagant for men who consider conquest and military fame, as the most estimable of all acquirements. Alexander, Ginges Khan, and Bonaparte, have been guided by similar sentiments. In writing this letter, I feel no enmity to the people of France, or any other people; on the contrary, I wish their happiness; for my principle is, that every nation profits by the prosperity of its neighbours, provided the governments of its neighbours be humane and just. What is here said, is directed against the tyrannic principles of Bonaparte, a man who has set himself above all law; he is therefore in that state which Lord Somers compares to that of a wild beast unrestrained by any rule, and he should

be hunted down as the enemy of mankind. This, however, is the business of Frenchmen. With regard to the nations of Europe, they can only hold him in governable limits, by fencing him round with bayonets."

Previously to Mr. Fulton's leaving France, his friend, Mr. Barlow, had revised and enlarged his *Vision of Columbus*, and was about publishing the splendid edition, under the title of the *Columbiad*, which has since appeared. The elegant plates which adorn that work, were executed under the superintendence and advice of Mr. Fulton. He paid about five thousand dollars for the paintings, the plates and letter-press; which gave him a property in the publication. He relinquished, by his will, all his right to the widow of Mr. Barlow, with the reservation of fifty of the proof and embellished copies of the work. It was printed in Philadelphia, in quarto, and published in eighteen hundred and seven; it is dedicated by Mr. Barlow to Mr. Fulton, in such terms

as evince the strong attachment which subsisted between these men of genius. The original paintings, from which the prints of the Columbiad were engraved, form a part of the handsome collection which Mr. Fulton has left to his family.

Before he departed from France, Robert R. Livingston, Esquire, to whose abilities, learning, ingenuity, and enterprise, our country owes so much, arrived as ambassador from the United States to the court of St. Cloud. He induced Mr. Fulton to revive his experiments on steam navigation, in the success of which Mr. Livingston, as well as Mr. Fulton, had long entertained the greatest confidence. But it seems better to follow Mr. Fulton through the course he pursued with his submarine and torpedo warfare, and subsequently to trace his progress in steam-boat navigation connectedly, rather than to be diverted from the one to the other, as they would present themselves if we were to be entirely governed by dates.

It has been mentioned, that the earl of Stanhope had taken great pains to inform himself as to Mr. Fulton's proceedings in France. This nobleman's mathematical and mechanical mind, perceived what consequence might result from the application of Mr. Fulton's inventions. The information he obtained was communicated to the British cabinet, and excited alarm. It was determined by the British ministry, if possible, to withdraw Mr. Fulton from France. Lord Sidmouth, who was then one of the ministers, contrived to have a communication with Mr. Fulton, while he was in Paris, and obtained his consent to meet an agent of the British government in Holland. In October, eighteen hundred and three, Mr. Fulton went from Paris to Amsterdam for this purpose. But the agent with whom he was to confer, did not arrive; and after being in Amsterdam three months, he returned to Paris.

It may be well to stop here, and notice a matter not otherwise of importance, than as it serves to mark the pliancy of Mr. Fulton's mind, and the versatility of his genius. At a time when he was taking a step, which, as he thought, would be decisive of the fate of nations, which put his life at risk, and might determine his own fortune, he amused himself with making sketches from the scenery of Holland, and representations of the manners, figures, and costume of the Hollanders; some of them are *broad* caricatures, which cannot but excite a smile. They are found in his port folio, and though in general they are but sketches, they show that they are from the hand of a master, guided by wit and genius.

Some time after his return to Paris, the agent whom he was to have met at Amsterdam, made his appearance in the French metropolis, bearing a letter from

Lord Hawkesbury to Mr. Fulton, which induced him to proceed to London, where he arrived in May, eighteen hundred and four. Lord Sidmouth was then out of office, and Mr. Pitt had resumed the administration. The new ministry seemed to approve of what had been done by their predecessors in relation to Mr. Fulton. He soon had an interview with Mr. Pitt and Lord Melville. When Mr. Pitt first saw a drawing of a torpedo, with a sketch of the mode of applying it, and understood what would be the effects of its explosion, he said, that if introduced into practice, it could not fail to annihilate all military marines.

It would have been extraordinary if Mr. Pitt, entertaining this opinion, should, as the minister of a nation which had then the only navy in the world, have felt cordially disposed to encourage an invention, that might deprive her of the mighty superiority she derived from her fleets. This was certainly the view that some of her states-

men had of the subject. When Mr. Fulton had an interview with the Earl St. Vincent, exhibited to him a torpedo, and described the effects it had produced, the noble earl, in the strong language of his profession, rather than in a style comporting with his new dignity, exclaimed against Mr. Pitt for encouraging a mode of warfare, which he said, with great reason, they who commanded the seas did not want, and which if successful, would wrest the trident from those who then claimed to bear it as the sceptre of supremacy on the ocean.

From the subsequent conduct of the British ministry, it may well be supposed, that they never truly intended to give Mr. Fulton a fair opportunity of trying the effects of his engines. The object may have been to prevent their being placed in the hands of an enemy; and if that was accomplished, it was the interest of England, as long as she was ambitious of maintaining the proud title of mistress of the seas, to make the

world believe, that Mr. Fulton's projects were chimerical. Nothing would be more likely to produce this effect, than abortive attempts to apply them. This would prevent other nations from making similar experiments, and might discourage the inventor.

We must not, therefore, be surprised to find that after Mr. Fulton had been induced to leave France, he was disappointed in all his expectations, whether they regarded himself or his inventions; and we should be careful not to receive as evidence of the inefficacy of his projects, the opinions of persons who had so deep an interest to make it be believed that they were futile. Nor should we conclude much from the failure of experiments, which were conducted by those, who could not but have wished that they might be unsuccessful.

In June, the British ministry appointed a commission to examine Mr. Fulton's projects. The commissioners were Sir Joseph Banks,

Mr. Cavendish, Sir Home Popham, Major Congreve, and Mr. John Rennie. Many weeks passed before Mr. Fulton could prevail on them to do any thing, and finally, when they met, they reported against the submarine boat as being impracticable. In a letter to the ministry, Mr. Fulton complains that this report was made without his having been called upon for any explanations, and although the gentlemen who made it had before them no account of what had been done. Indeed, in the first interview which Mr. Fulton had with Mr. Pitt and Lord Melville, the latter condemned the Nautilus without a moment's consideration.

At about this time, an expedition was fitted out against the French flotilla in the roads of Bologne. In the night, torpedoes were thrown, by boats from a British squadron, across the bows of two of the French gun-brigs. The Frenchmen, when they discovered the torpedo-boats, exclaimed, with

horror, that the infernal machines were coming! They had in their minds, no doubt, the effects of some vague reports as to Mr. Fulton's engines; and were terrified by knowing what had been the tremendous consequences of the explosion, in the streets of Paris a short time previously, of a machine intended against the life of Bonaparte.

The torpedoes exploded alongside of the French vessels, without doing them any injury. Mr. Fulton imputed this failure to a mistake, arising from want of experience, in what was apparently a slight matter. The torpedo had been so placed, as that it hung perpendicularly by the side of the vessel, whereas it should have been so arranged, as that the current would have swept it under her bottom. This, he was convinced, might be accomplished by the simple contrivance of attaching to the torpedo a bridle, in such a manner as that it should lie in the water, at an angle with the line of di-

rection of the current. This, when the torpedo was stopped by a line connected with it, meeting the hawser or bow of the vessel, would give it a sheer which would carry it towards the keel of the vessel to be destroyed. Mr. Fulton's subsequent experiments, proved that his theory on this subject was perfectly correct.

To counteract the effects of this disappointment, which was calculated to make it be believed, that a vessel could not be destroyed by a torpedo, Mr. Fulton prevailed on the ministers to suffer him to demonstrate to them by experiment, not only the efficacy of the engines, but the cause of the failure at Bologne.

On the fifteenth of October, eighteen hundred and five, he blew up a strong built Danish brig, of the burden of 200 tons, which had been provided for the experiment, and which was anchored in Walmar roads, near Deal, within a mile of Walmar Castle, the

then residence of Mr. Pitt. He has given an interesting account of this experiment in a pamphlet which he published in this country, under the title of Torpedo War. In a letter to Lord Castlereagh, of the sixteenth of October, eighteen hundred and five, he says, "yesterday, about four o'clock, I made the intended experiment on the brig, with a carcass of one hundred and seventy pounds of powder; and I have the pleasure to inform you, that it succeeded beyond my most sanguine expectations. Exactly in fifteen minutes from the time of drawing the peg, and throwing the carcass into the water, the explosion took place. It lifted the brig almost bodily, and broke her completely in two. The ends sunk immediately, and in one minute nothing was to be seen of her but floating fragments; her main-mast and pumps were thrown into the sea; her foremast was broken in three pieces; her beams and knees were thrown from her decks and sides, and her deck planks were rent to fibres." In fact, her annihilation was com-

plete, and the effect was most extraordinary. The power, as I had calculated, passed in a right line through her body, that being the line of least resistance, and carried all before it. At the time of her going up, she did not appear to make more resistance than a bag of feathers, and went to pieces like a shattered egg-shell."

Notwithstanding the complete success of this experiment, the British ministry seem to have been but little disposed to have any thing further to do with Mr. Fulton or his projects. Indeed the evidence it afforded of their efficacy, may have been a reason for this. However Mr. Pitt and Lord Melville may have thought on the subject, there had been a change in the administration, and the new ministers may have agreed with the Earl St. Vincent, that it was great folly in them to encourage a project, which, if it succeeded, would destroy the maritime power of Great Britain. Lord Grenville and his cabinet were not only indisposed to encou-

rage Mr. Fulton ; but they were unwilling to fulfil the engagements which their predecessors had made ; and Mr. Fulton, after some further experiments, of which we have no particular account, wearied with incessant applications, disappointments, and neglect, at length embarked for his native country.

It would be doing injustice to the memory of Mr. Fulton, as well as to that of another ingenious native American, not to notice before we leave this subject, that Mr. Fulton did not pretend to have been the first who discovered that gunpowder might be exploded with effect under water ; nor did he pretend to have been the first who attempted to apply it as the means of hostility. He knew well what had been done by Bushnell in our revolutionary war. He frequently spoke of the genius of this American with great respect, and expressed a conviction that his attempts against the enemy, would have been more successful if he had had the advantages which he himself derived from

the improvements of nearly forty years in mechanics and mechanical philosophy.

Notwithstanding Mr. Fulton's mind, during his residence in England, was so occupied with his great project ; notwithstanding his disappointments and the mortification which, in all countries, is generally the consequence of any dependence on men high in office, Mr. Fulton thought and wrote on other subjects. A man by the name of Parkinson, apparently had the credulity to believe that he could live in America without the labour which his occupation as a farmer required in the climate of Europe, and possibly had consulted no higher authority as to what would be his fortune in this country, than some of the gipsy tribe which he may have found under the hedges of his farm. After having been in the United States for some time, this man returned to his native country, and published a book under the title of "A Tour in America." Mr. Fulton thought it worth while to notice the illibe-

rality and misrepresentations of this performance, in a publication on the subject, in the British journals. He speaks of Mr. Parkinson's book, as the production of a mind attached to local habits, and discontented with every thing which does not correspond with a peculiar mode of life. The work was intended to prove that nature had been extremely unkind to the United States; that the climate is unfriendly to the human species; and that the ungrateful soil never rewards the toil of the cultivator. Mr. Fulton asks, how is it then that we have such a most extraordinary increase of population? Whence come our great exports, and the millions which we pay to England for her manufactures. Upon these subjects he enters into very interesting calculations, and contrasts our situation when we were but two centuries old, with that of Great Britain only two hundred years ago. Then she had not, says he, a turnpike-road, not a waggon or carriage to travel in; none of the fine sheep and cattle now so justly admired;

no irrigation, nor the productive system of successive crops. At that time, says Mr. Fulton, turnips, cabbages, and carrots were great articles of commerce from Brabant to London. In sixteen hundred and ninety-seven, the whole exports from England, were no more than three millions and a half, and the imports did not exceed that amount. There is great forbearance in the mildness and charity, with which he treats Mr. Parkinson and his book. But, however, we may commend this forbearance, we do not find it very easy to imitate it, when speaking of a work which manifests so much prejudice, ignorance, idleness, vanity, illiberality, and gross misrepresentation.

Mr. Fulton, as illustrative of the prejudices which are acquired by habit, and to show how apt we are to consider every thing wrong or bad in a foreign country, which differs from what we have been accustomed to in our own, relates in one of the publications we have mentioned, the fol-

lowing anecdote : "The Abbé Gregoir came over to France from England, after having made a tour through that country. His amiable character and excellent qualities had introduced him to the best society, in which he met with the most hospitable reception. On his return to Paris, says Mr. Fulton, I asked him how he liked England. He answered, the English are a generous, hospitable, good people, and the country would be charming, had it pleased God to give them some sunshine and French cooks. The country, he said, was always enveloped in clouds ; and he was starved on abominable legs of mutton, roast beef, beef-steaks, plum-puddings, cabbages and potatoes, none of which were half cooked, and were served with sauce hardly eatable ; the porter was bitter, and the port wine so strong he could not drink it. In fact, says Mr. Fulton, the good Abbé preferred France, and being of a humane disposition, seemed to feel sorry for the many inconveniences, under which he supposed the people of England laboured."

Mr. Fulton's attachment to the fine arts, led him to conceive the design of inducing his countrymen to purchase the works of Mr. West, the principal part of which, that great artist was then willing to part with. For this purpose he wrote an address to the citizens of Philadelphia, urging them to establish an institution for the fine arts, similar to the one which now exists in that city. After exhibiting, with great force and animation, the advantages to be derived from the cultivation of a taste for painting and sculpture, and portraying the character and merits of Mr. West, with all the warmth of friendship and admiration, Mr. Fulton says, "I now have the pleasure to offer you a catalogue of the select works of Mr. West, and with it to present you the most extraordinary opportunity that ever was offered to the lovers of science. The catalogue referred to, is a list of all Mr. West's productions, portraits excepted. No city ever had such a collection of admired works from the pencil of one man; and that man is your fellow-

citizen. The price set on the collection is fifteen thousand pounds sterling; a sum inconsiderable when compared with the objects in view, and the advantages to be derived from it."

Mr. Fulton then proceeds to propose means for raising the necessary funds, and to suggest arrangements for the establishment, which he wishes might be called the **Westian Gallery**.

This proposition could not have been made without the assent of **Mr. West**. If it were so, it is curious to remark, that he was then willing to part with his whole collection, which must have contained the works of the prime of his life, for little more than he has since received for a few of his celebrated paintings.

Every man to whom this proposition was addressed, must now deeply regret that it was not accepted; and the more so, because

we learn from this same address of Mr. Fulton, that had the offer been accepted, and the plan proposed by Mr. Fulton carried into execution, Mr. West would probably have returned to, and have spent the evening of his life, in his native country.

At the sale of the pictures of the Royal Academy, in eighteen hundred and five, Mr. Fulton purchased West's Ophelia, and his King Lear; for the first of these he gave one hundred and twenty-five, and for the other two hundred and five guineas. In such estimation were the works of West, that the English seemed to have been unwilling to spare us even these specimens of his talents. A periodical work published in London at this time, thus notices the purchase of Mr. Fulton; "we have to regret that the two last-mentioned pictures, which are the most happy productions of the truly classic mind of Mr. West, are going out of the country. They have been purchased by an American gentleman (Mr. Fulton of Philadelphia), and are

to be the first ornaments of a gallery, which is to be established in that city. We cannot part with them without feeling interested in the fate of the beautiful Ophelia, whose charming elegance, mingled with delirious wildness, fills the soul with the most lively sentiments; nor with the majestic Lear, whose heart seems torn with ingratitude, and the sense of complicated evils. There is a grandeur of conception, and spirit of execution in this picture, which has been seldom surpassed, and which can only be enjoyed by men of cultivated taste and elevated minds. In such paintings, we are not to look for delicate complexions, smooth and polished surfaces, or fine colours; nor do we look for such qualities in the works of Raphael; but for correct drawing, fineness of touch, fine flow of drapery, dignity of character, and movement of soul, all of which are treated in these pictures with the highest order of intellect, and will rank them among the most distinguished works of art, when Mr. West will be no

more. Feeling as we do, it is with reason we regret that those pictures are to leave this country; but it must be highly gratifying to the Pennsylvanians, to possess such works of their celebrated and much esteemed countryman."

This eulogy on one of the earliest, best, and most respected friends of Mr. Fulton, will not be considered, it is hoped, as a too long, or as a misplaced digression. A criticism written with so much taste and judgment on these celebrated pictures, which now by the permission of the executors of Mr. Fulton, adorn the walls of our gallery, cannot be unacceptable. The genius of West and Fulton have secured them an immortal fame. It is possible, that the humblest effort to preserve memorials of either of them, may rescue from oblivion a performance of the slightest merit; and when succeeding generations shall view, with increased admiration, these productions of the first and greatest American master, improved

by the hand of time, their history will not be uninteresting, and will be thought to have been worth preserving.

Mr. Fulton embarked at Falmouth, in October, eighteen hundred and six, and arrived at New-York, by the way of Halifax, on the thirteenth of December, in the same year.

Upon his arrival in this country, he immediately engaged in the pursuit of both the objects which had latterly engaged his attention in Europe; that is, submarine war, and steam navigation. For the last, he had made some preparations before he left England. But we think it will be preferable still to postpone this important subject, so that it may in the sequel be presented in one view, and for the present to trace the outline of his progress in his other pursuits.

So far from being discouraged by the failure of his torpedoes to produce the desired effect in the attempts which had been

made in Europe, to apply them as instruments of hostility, he felt not the least diminution of his confidence, because he saw, as he said, that these failures were to be attributed to trivial errors, which actual experience only could discover, and which were easily to be corrected. He had not been landed in America a month, before he went to the seat of government, to propose to the administration to enable him to prosecute a set of experiments with his torpedoes. He found Mr. Madison, then Secretary of State, and the Secretary of the Navy, Mr. Smith, much disposed to encourage his attempts, the success of which, Mr. Fulton, by his ingenious models and drawings, with his lucid and engaging mode of lecturing upon them, made to appear so probable. The government authorized a certain expenditure to be made, under the direction of Mr. Fulton, for this purpose. In the mean time, anxious to prepossess his countrymen with a good opinion of his project, he invited the magistracy of New-York, and a number of citi-

zens, to Governor's Island, where were the torpedoes and the machinery, with which his experiments were to be made: these, with the manner in which they were to be used, and were expected to operate, he explained very fully. While he was lecturing on his blank torpedoes, which were large empty copper cylinders, his numerous auditors crowded round him. At length, he turned to a copper case of the same description, which was placed under the gateway of the fort, and to which was attached a clock-work lock:—This, by drawing out a peg, he set in motion, and then said to his attentive audience, “gentlemen, this is a charged torpedo, with which, precisely in its present state, I mean to blow up a vessel; it contains one hundred and seventy pounds of gunpowder, and, if I were to suffer the clock-work to run fifteen minutes, I have no doubt but that it would blow this fortification to atoms.” The circle round Mr. Fulton was very soon much enlarged, and before five of the fifteen minutes were out, there were but

two or three persons remaining under the gateway ; some, indeed, lost no time in getting at the greatest possible distance from the torpedo, with their best speed, and did not again appear on the ground, till they were assured it was lodged in the magazine, from whence it had been taken, and did not seem to feel themselves quite safe, as long as they were on the island. The conduct of Mr. Fulton's auditors was not very extraordinary or unnatural; but his own composure indicated the confidence with which he handled these terrible instruments of destruction, and the reliance he had on the accuracy of the performance of his machinery. The apprehensions of the company surprised, but amused him, and he took occasion to remark, how true it was that fear frequently arose from ignorance.

Mr. Fulton, while he was on this visit to Washington, was invited by General Dearborn, the then Secretary at War, to make the necessary surveys and drafts for a canal

from Lake Pontchartrain to the Mississippi. He declined this undertaking on account of his engagements with his steam-boats and torpedoes. On these, he says, in a letter to the secretary, "I labour with the ardour of an enthusiast." He avails himself of this opportunity of submitting to the government, some ideas on canal navigation; and this letter contains the earliest suggestion, we have met with, of the practicability and advantages of a canal to unite our great western lakes with the waters of the Hudson.

In the summer of eighteen hundred and seven, the affair of the British ship of war Leopard, and the United States' frigate Chesapeake, which excited such universal indignation throughout the American nation, happened. It immediately occurred to Mr. Fulton, that the government would, on account of this outrage, banish British vessels from our harbours, and interdict their entrance into our waters. He knew how incompetent our naval or military armaments were

to enforce such mandates. He offered his personal services, with his torpedoes, to compel the British vessels to be obedient to the will of the government, if it should pursue this course. His letter to the Secretary of the Navy, to this effect, is dated the sixth of July. On the seventh, Mr. Fulton found the president had issued a proclamation prescribing the measures he had anticipated. He immediately reiterated his offer, pressing to be permitted to make the requisite preparations, and to be allowed to conduct an attack himself if any should be necessary. But happily, the British were not so obstinate as to afford an opportunity of trying this terrible mode of compulsion.

On the twentieth of July, eighteen hundred and seven, in pursuance of the experiments which the government had authorized him to make, he blew up, with a torpedo, in the harbour of New-York, a large hulk brig which had been provided for the purpose. Of this experiment, Mr. Fulton has given a

circumstantial account in his work, entitled *Torpedo War*. There were several unsuccessful attempts to place and fire the torpedoes, so that the explosion did not take place till several hours after the time fixed for it by Mr. Fulton, and after it was expected by the multitude of spectators who crowded the shores. The torpedo locks missed fire several times ; this was owing to the following trivial circumstance: Mr. Fulton had tried his prepared carcasses in a tub of water, till he found they were so balanced by the cork-wood, or buoyant matter attached to them, that they would retain the desired position; but he had done this without their locks, which were of considerable weight, being attached to them. When these came to be fixed to the torpedoes, and thrown into the river, to be floated against the hulk, the additional gravity, which the locks gave to one side of the torpedoes, reversed them, so that the locks were downwards: the consequence was, that when the hammer of the lock drove up the pan, the priming-powder fell out, and the spark from

the flint could have no effect. Nothing could have been more easy, than to have provided against such an occurrence; but it was in vain to attempt to correct the error at that moment: an adjustment of the parts of the machinery was necessary, which required leisure; so much does matters of this kind depend on slight circumstances, and so necessary is practice to perfect every theory. At length, however, the explosion took effect, and nothing was seen in the place of the vessel, but a high column of water, smoke, and fragments. This experiment only served to prove, to the inhabitants of New-York by ocular demonstration, what indeed was not doubted by any one who had the least acquaintance with the subject, that the explosion of a torpedo under a vessel's bottom would annihilate her.

The day after this experiment, Mr. Fulton addressed a letter to the governor, mayor, and members of the corporation of New-York, from which the following are extracts:

“Yesterday my desire to satisfy public curiosity at the stated minute, was as great as my never-ceasing anxiety, to see our harbours and coast placed beyond the power of foreign insults, and I lament exceedingly that numbers were disappointed by the explosion not taking on the first attack; but it has given me much additional confidence in my engines.

“On taking the torpedoes out of the water, where they had been for two hours, I found the locks and powder perfectly dry; I immediately discovered the cause of the failure, which I corrected by placing a piece of quick match in the charge which the lock contained: Thus arranged, the fire was communicated to the seventy pounds of powder in the body of the torpedoes, an explosion took place, and the brig was decomposed.

“You have now seen the effect of the explosion of powder under the bottom of a vessel; and this, I believe, is the best, and

most simple mode of using it with the greatest effect in marine wars; for a right application of one torpedo will annihilate a ship, nor leave a man to relate the dreadful catastrophe. Thus, should a ship of the line, containing five hundred men, contend with ten good row-boats, each with a torpedo and ten men, she would risk total annihilation, while the boats, under the cover of the night, and quick movements, would risk only a few men out of one hundred.

“When two ships of equal force engage, it may be doubtful which will gain the victory; frequently one hundred men are killed on each side, as many wounded, and the ships much injured; but even the vanquished vessels will admit of being repaired, and thus the number of ships of war are not diminished; but continue to increase and tyrannise over the rights of neutrals, and peaceable nations.”

“ Having now clearly demonstrated the great effect of explosion under water, it is easy to conceive, that by organization and practice, the application of the torpedoes will, like every other art, progress in perfection. Little difficulties and errors will occur in the commencement, as has been the case in all new inventions; but where there is little expense, so little risk, and so much to be gained, it is worthy of consideration, whether this system should not have a fair trial. Gunpowder within the last three hundred years has totally changed the art of war, and all my reflections have led me to believe that this application of it, will in a few years put a stop to maritime wars, give that liberty on the seas, which has been long and anxiously desired by every good man, and secure to America that liberty of commerce, tranquillity, and independence, which will enable her citizens to apply their mental and corporeal faculties to useful and humane pursuits, to the improvement of our

country and the happiness of the whole people."

These experiments appear to have excited some anxiety in England. At about this time, there was a prospect of a rupture between the United States and Great Britain. In a speech on American affairs, made by Lord Stanhope in the house of Lords, soon after these experiments were made, he is reported, in an English newspaper, to have said, "it was not perhaps sufficiently known that, at that very moment, exertions were making in America to carry into effect a plan, for the disclosure of which, an individual had, a few years before, demanded of the British government fifteen thousand dollars, but had been refused. He alluded to a plan, he said, for the invisible destruction of shipping, and particularly of men of war: That the inventor of this scheme was then in America, and it was ascertained that it would not, on an average, cost twenty pounds to destroy any ship whatever."

Having made improvements on his invention, and learned much, as he conceived, by his late experiments, Mr. Fulton in January, eighteen hundred and ten, again visited Washington. Mr. Jefferson, Mr. Madison, and a number of members of congress, assembled by his invitation at Kalorama, the seat of his friend Mr. Barlow, to see his new models and drawings, and to listen to his explanations of them, and of the modes in which he intended they should be applied.

Soon after this, he published his work, entitled "Torpedo War," or Submarine Explosions. He adopted as a motto for his publication, his favourite sentiment, "the liberty of the seas will be the happiness of the earth." He addressed it to the President of the United States, and to the members of both houses of congress: It contained a description of the experiments he had made, of his engines as he had improved them, and of the manner in which they might be used. He expressed the most sanguine expectations

as to the effects they would produce, when they had attained the improvements, of which he believed them capable, and had the advantage of practice, by which gunnery, and other modes of warfare, had been brought to their present perfection. He exhibits, in this work, calculations to show what would be the expense of a torpedo establishment, and contrasts it with the cost of the existing naval armaments. In a note, he says, the work was published in haste, and declares his intention of publishing subsequently, a detailed account of the origin and progress of his invention, and of the embarrassments under which he had laboured, in bringing it to its then state; but this design was never executed. He also intended to write his life, and to leave memorials of many inventions which he had in his mind. Unfortunately a biography, which would have been so interesting from his own pen, is now to be given by another, from such slight materials as have been casually preserved. Conceptions from which the world might

have derived benefits equal to those for which it is indebted to him, and now enjoys, are lost till Providence in its bounty to mankind, shall animate another Fulton.

The members of congress were so favourably impressed with respect to Mr. Fulton's inventions, by the lectures which he had given upon them in their presence, that in March, eighteen hundred and ten, they passed an act making an appropriation for trying practically the use of torpedoes, and submarine explosions. For this purpose, five thousand dollars were granted, to be expended at the discretion of the president, under the immediate direction of the secretary of the navy. In execution of this act, it was proposed that some preliminary experiments should be made in the harbour of New-York. The secretary of the navy addressed a circular letter to several gentlemen, inviting them to be present at the experiments, and to make a report, so far as the gentlemen might be enabled to form satisfactory

opinions. Commodore Rodgers and Commodore Chauncey, were directed to give their superintendence.

In the month of September, Mr. Fulton exhibited to the gentlemen appointed by the government, the models of his engines, and explained to them the manner in which he proposed they should be used. His machines were torpedoes, which were to be applied to the bottom of a vessel in various ways. First, he proposed, that two torpedoes should be united by a coupling line; that they should be floated in the tide at a certain depth beneath the surface, and suffered to drift down on each side of the vessel to be attacked, so as that the coupling line would be arrested by the cable of the vessel: This would occasion the torpedoes, when pressed by the force of the current, to approach each other and come in contact with the inferior parts of the vessel to be destroyed. Secondly, he proposed that a torpedo should be fastened to one end of a line, the other end of which should be attached to a har-

poon, which was to be discharged into the bows of a vessel at anchor in a current, or underway, from a piece of ordnance, that he had contrived, and which was to be carried by a light boat constructed for the purpose. He conceived that such a boat might approach a hostile vessel near enough to do execution, with at least as little danger as fire-ships are exposed to, in accomplishing their objects. The line being fastened to the vessel, at one end, by the harpoon, the current, if the vessel was at anchor, or the progress of the vessel through the water, if she were underway, would bring the torpedo at the other extremity of the line under her bottom. The torpedoes when in this situation were to be discharged by clockwork-locks, or by locks so constructed, that the triggers would be drawn by levers connected with them, coming in contact with the vessel.

He proposed also to apply a torpedo, by having it attached to a long spar, which

should be suspended by a swivel from the bowsprit of a torpedo boat, so nearly on a balance, that a man, in the bow of the boat, could elevate or depress the torpedo with one hand, while with the other he could pull a string attached to the trigger of the lock, when the torpedo should be run under the bottom of a vessel.

He also proposed to employ in his "torpedo war," what he called block-ships; that is, large vessels of from fifty to one hundred tons measurement, the sides of which were to be cannon proof, and the decks impenetrable to musket shot. Each of these vessels was to be propelled by machinery, which was to be worked by her crew, who were to be under the protection of her impenetrable sides. On each quarter and bow she was to be armed with a torpedo fastened to a long spar, the interior end of which was to be supported, and braced by ropes from the yards, like the lower steering-sail-boom of a ship. By means of these spars, the torpe-

does were to be thrust under the bottom of the vessel to be destroyed. He afterwards thought of employing our common river sloops for this purpose, and to prepare them for it by lining them with thick timber, and covering their decks with pretty stout sheet-iron. He supposed that these might be navigated by their common sails. It was his idea, that if a man of war of the largest size, was attacked by ten or twelve such vessels assailing her from all quarters, she could not defend herself so as to prevent the approach of all of them: If only one of them got sufficiently near, the destruction of the vessel attacked would be inevitable. The torpedo vessels would not be affected by the explosion, because, according to his theory, the correctness of which was proved, by what happened in the attack on the French vessels, in the roads of Bologne, and by other experiments, the force of powder exploded under water, is always perpendicularly to the surface: The lateral pressure of the mass of waters of the sea or of a river,

opposes an infinite resistance to a sudden impulse, and confines the course of an explosion, in a line at right angles to the surface, as certainly as the sides of a cannon directs the force of a discharge in the course of its calibre. If ten or twelve such vessels were, in our harbours or on our coasts, a match for a man of war, we should be able to make a maritime defence at much less expense of men and money, than it would cost to attack us; for ten or twelve of these torpedo vessels and their equipment, would require much less of men and money than a man of war.

But to return to Mr. Fulton's proceedings before the commissioners appointed by the government. At the first interview above-mentioned, he explained to them his stationary torpedoes, as he has described them in his Torpedo War. These were to be carcasses of powder like those before described. Having levers attached to the triggers of the locks; numbers of them were to be anchor-

ed in the channel through which vessels, to make an attack, must pass : The hostile vessel in passing over a torpedo, would press the lever and cause an explosion.

Another machine, which Mr. Fulton exhibited and explained to the commissioners, was one which he had invented subsequently to his publication of the Torpedo War. He called it a cable-cutter. On this he placed great reliance, even in the state in which it then was ; but which he afterwards greatly improved.

This machine consisted of a large iron hook, upon the shaft or haft of which was placed a small piece of ordnance, charged with powder as in the common mode, and an instrument with a chisel or cutter at the outward end, of a crescent form : The piece was to be discharged by a water-proof-lock, like those used for the torpedoes : To the iron part of this machinery, was attached a sufficient quantity of wood or buoyant mat-

ter to support it. From the buoyant matter, the iron was to be supported by cords, or chains, at any required depth: To the extreme end of the shaft of the hook, was attached a long line, the other end of which was fastened to a floating body: Thus prepared, the machine for an attack upon a vessel at anchor, in a tide-way, was to be thrown into the current at any distance above the object: The hook with its appurtenances on one side of her, and the buoy at the other extremity of the line on the other side; the current would then carry them both down the stream, till the line was intercepted by the cable of the vessel; when in this position, the buoy at one end of the line, which was to be of such size as to present a greater resistance to the water than was at the other end, would draw the line across the cable, till the hook embraced it, and would bring the cable immediately before the muzzle of the piece of ordnance, and of course directly in opposition to the chisel or cutter: At the moment the cable was in this position, it

pressed against a lever which crossed the hook, and which communicated with the trigger of the lock; by this means the piece was fired, and the cable separated by the cutter.

In these attacks, so much of the machinery was permitted to be seen on the surface of the water, that they could only be made with a chance of success at night; but Mr. Fulton thought the buoyancy of the machine might be so arranged, as to keep the whole below the surface of the water, and thus render the attack at all times invisible.

In the months of September and October, the commissioners assembled several times at the navy-yard, to witness Mr. Fulton's experiments. The sloop of war *Argus*, which was then commanded by the gallant Captain Lawrence, was to have been the subject of them: She had been prepared to defend herself against them, under the orders of Commodore Rodgers, after Mr. Fulton had



explained to him his proposed mode of attack. She had a strong netting suspended from her spritsail-yard, which was anchored at the bottom; she was surrounded by spars lashed together, which floated on the surface of the water, so as to place her completely in a pen; she had grappling irons, and heavy pieces of the same metal, suspended from her yards and rigging, ready to be plunged in any boat that came beneath them; she had great swords, or scythes, fastened to the ends of long spars, moving like sweeps, which, unquestionably, would have mowed off as many heads as came within their reach. Whatever might have been the ingenuity of the proposed mode of attack, there was certainly no little in the dispositions for defence. It was instantly seen by every one, that these were not to be encountered, with success, by any means which Mr. Fulton had then prepared. This he at once acknowledged; but expressed his confidence that he should find means of surmounting them. One of the gentlemen appointed by the government to

attend these experiments, in his report to the secretary of the navy, which we shall hereafter notice, says, "a vessel of war surrounded by large booms and spars, with nets as deep as the water, hanging from her bows, with her rigging loaded with weighty pieces of iron, and with grapnel and shot suspended from her yards to guard against torpedoes, and with chains to guard her cables, must be much less wieldy, and of course much less formidable for attack or defence, than she would be without such incumbrances." The report adds, "an invention which will oblige every hostile vessel that enters our ports, to guard herself by such means, cannot but be of great importance in a system of defence." Mr. Fulton contented himself for that time, with exhibiting a torpedo, and trying some experiments with his harpoon and cable-cutter; neither of which entirely answered his expectations. The harpoon, fired from a small piece of ordnance at a target, did not take effect at so great a distance as he supposed it would do,

and there was more difficulty in bringing the cable-cutter in contact with the cable to be cut, than he anticipated ; but at that time he had not made his last improvements on this machine. There was no contrivance by which it would explode itself at the proper moment, as above described ; neither was it calculated to fix itself upon the cable, by means of a float, at the opposite end of the line attached to the hook. In the experiment which Mr. Fulton exhibited at this time, he attempted to produce an explosion by a long string which led from the trigger of the piece to a boat, which, after dropping the machine in the water at a distance from the vessel on one side, was to row across her bows to the other side, and then down the stream, till the line, one end of which was fastened to the machine, and the other end to the boat, brought the cable-cutter in its proper position ; and then the string, connected with the trigger, was to be pulled by a person in the boat. All this was certainly too complicated, and the assailants

were too much exposed, to raise any expectations that this mode of attack could be practised with any effect; but Mr. Fulton was persuaded, that the improvements which he afterwards made on this machine, and which we have attempted to describe, rendered it very practicable.

After several attempts, however, Mr. Fulton succeeded in placing his machine, and with it cut off, several feet below the surface, a fourteen inch cable, which was attached to a vessel that had been anchored in the stream for the purpose.

This experiment was satisfactory so far as not only to show, that a cable might be cut under water by these means; but it proved that a gun might be fired in that situation with effect, and from this Mr. Fulton took the idea of firing under water, cannon charged with balls or bombs, which he afterwards attempted.

The gentlemen, appointed by the government to report on these experiments, did not entirely agree in sentiments respecting them. Chancellor Livingston, Governor Lewis, and Mr. Colden, availed themselves of the invitation of the secretary of the navy, to express their respective opinions on the merits of Mr. Fulton's system.

Chancellor Livingston, after a long examination of each particular subject which the experiments had presented, expresses himself as follows: "Upon the whole, I view this application of powder, as one of the most important military discoveries which some centuries have produced. It appears to me to be capable of effecting the absolute security of your ports against naval aggression; provided, that in conjunction with it, the usual means necessary to occupy the attention of the enemy, are not neglected."

General Lewis, who served his country through the war which established her inde-

pendence, and led her armies in the late contest, to support it, whose opinion on every account is entitled to the greatest respect, but whose long military services and experience, must render his judgment on this subject deserving of the highest consideration, in his report, says, "I might add without extravagance, they (the experiments) warrant an expectation, that, aided by government, (which every practical science promising public utility is entitled to be) and the efforts of genius, the submarine use of gunpowder will, at no distant period, be entitled to rank among the best and cheapest defences of ports and harbours." Mr. Colden concludes his letter to the secretary of the navy as follows: "I think Mr. Fulton's experiments give us ground to suppose that the knowledge of gunpowder is yet in its infancy, and that in time, this new application of its irresistible force by submarine explosions, may produce greater changes in the world, than have been made

by it since its use was adopted in Europe." The rest of the gentlemen of the committee could not agree with those who made separate reports, further than to unite with them in a statement which was but little more than a detail of facts. They did not think the experiments could warrant them in expressing any other opinion, than that the system was then too imperfectly demonstrated, to justify the government in relying upon it as a means of defence. In expressing this opinion, however, they say, we disclaim any intention of attempting to discourage such investigations and experiments, as the wisdom of government, aided by other lights and information than the committee possessed, should consider fit and useful.

Commodore Rodgers also made a report, which contained a journal of the daily proceedings of Mr. Fulton and the committee, and very minute descriptions of the machines and experiments. His opinion was

entirely against Mr. Fulton's system, and he concludes, that every part of it would be found wholly impracticable.

These reports were forwarded to the secretary of the navy by Mr. Fulton, with a letter from himself. His buoyant mind was never to be depressed: He gives his own views of the experiments, and writes with increased confidence in his ultimate success. He expresses himself satisfied with the report of the committee, and thinks their opinions were as favourable to the infant art as under all circumstances could have been expected.

It is due to Mr. Fulton, to give some extracts from this letter. He says, "it is proved and admitted, first, that the waterproof locks will ignite gunpowder under water; secondly, it is proved that seventy pounds of powder, exploded under the bottom of a vessel of two hundred tons, will blow her up; hence it is admitted, that if a

sufficient quantity of powder, (and which I believe need not be more than two hundred pounds) be ignited under the bottom of a first rate man of war, it would instantly destroy her ; thirdly, it is proved and admitted, by all parties concerned in the experiments, that a gun can be fired under water, and that a cable of any size may be cut by that means, at any required depth.

“ With these *immensely* important principles proved and admitted, the question naturally occurs, whether there be within the genius, or inventive faculties of man, the means of placing a torpedo under a ship, in defiance of her powers of resistance. He who says that there is not, and that, consequently, torpedoes never can be rendered useful, must of course believe, that he has penetrated to the limits of man’s inventive powers, and that he has contemplated all the combinations and arrangements, which present or future ingenuity can devise, to place a torpedo under a ship.

“It must be admitted that the whole of the experiments at New-York were badly executed: I had not a man practised, nor am I experienced in the use of my own machines: I consequently was under the necessity of explaining my theory, by such imperfect means as I had in my power; yet, under all these disadvantages, I have gained much useful experience, and evidently convinced some of the committee, of the great importance of persevering, and particularly with a view to harbour defence. By the experiments, I have discovered much of the strength and resources of my opponents, and I am satisfied, that I can defeat any obstruction which has hitherto been presented; this I hope to prove after some practice. But having witnessed the activity, and resources of mind, which Commodore Rodgers and Captain Chauncey possess, I look forward to contend with new and difficult combinations, which they may produce for defence: In this manner it is probable we shall discover the principal means of defence

against torpedoes, and modes of attack with them, until, like the attack and defence of fortified places, the measures to be pursued on each side, in all cases, will become familiar; and a fair calculation may be made on the mode of attacking a ship.

“I will do justice to the talents of Commodore Rodgers: The nets, booms, kentledge, and grapnels, which he arranged around the Argus, made a formidable appearance against one torpedo boat, and eight bad oars-men: I was taken unawares: I had explained to the officers of the navy, my means of attack; they did not inform me of their means of defence; the nets were put down to the ground, otherwise I should have sent the torpedoes under them. In this situation, the means with which I was provided, being imperfect, insignificant, and inadequate to the effect to be produced, I might be compared to what the inventor of gunpowder would have appeared, had he lived in the time of Julius Cæsar, and presented

himself before the gates of Rome with a four pounder, and had endeavoured to convince the Roman people, that by means of such machines, he could batter down their walls. They would have told him that a few catapultas casting arrows and stones upon his men, would cause them to retreat; that a shower of rain would destroy his ill guarded powder; and the Roman centurions, who would have been unable to conceive the various modes, in which gunpowder has since been used to destroy the then art of war, would very naturally conclude, that it was a useless invention; while the manufacturers of catapultas, bows, arrows and shields, would be the most vehement against further experiments.

“I had not one man instructed in the use of the machines, nor had I time to reflect on this particular mode of defending a vessel. I have now, however, had time, and I feel confident that I have discovered a means which will render nets to the ground, booms,

kentledge, grapnels, oars with sword-blades through the port-holes, and all such kinds of operations, totally useless.

“As it does not require so much bravery to make an attack with a torpedo-ship, as to grapple a fire-ship to an enemy, the use of fire-ships proves, that courage is to be found to attack with those which may be armed with torpedoes.

“I unite with the committee in opinion, that government should not rely on this mode of defence, until its utility be fully proved. It never has been my wish that such confidence should be placed in torpedoes, until fair experiment has proved their value beyond a doubt.”

It would not be doing justice to Mr. Fulton, to pass over these transactions without noticing the industry, perseverance, indefatigability, presence of mind, and command of temper, which they gave him an opportunity

of displaying. Throughout the whole course of the experiments, no opposition or contradiction, no failure or disappointment, irritated, discouraged, or discomposed him. When his machines were broken or disordered, he, with the utmost calmness and composure, pointed out their defects or the causes of his disappointment. If an experiment failed, though it had cost him great pains and labour in the preparation; and although the failure was frequently, and obviously, owing to the awkwardness or unskilfulness of those who assisted him, his temper could not be disturbed; he would not hear the scoffs of some of the numerous bystanders, which were frequently expressed in whispers intended to reach his ear. Not a fretful or angry word ever escaped him, and after a disappointment he recommenced his preparations with the same ardour, and with the same calmness, with which he at first began: Even when his physical strength must have been exhausted by his corporeal exertions, and the excessive fatigue he would sometimes undergo through

a sultry day, his spirits were never for a moment depressed. On these occasions, he showed himself as much a moral as a mechanical philosopher.

In a communication which he addressed to gentlemen, who were appointed to confer with him by the British ministry, on the subject of his inventions, he submits to them some interesting reflections on the usual progress of new discoveries, with which we shall conclude what we have at present to say, in relation to his torpedo war and submarine explosions.

“In the beginning of the sixteenth century,” says Mr. Fulton, “plenum was the doctrine of philosophers, and it was thought that from the abhorrence which nature had to a vacuum, fluids might be held to any height by suction. Torricelli concluded, that if a column of water about thirty-three feet high, was equal to resisting the pressure of the whole height of a column of air, having the same

base, a column of mercury (that metal being fourteen times heavier than water) of proportional height, would be equal to the column of water. Having filled a glass tube with mercury, and inverted it in a basin of the same fluid, he found the mercury descend in the tube, to twenty-nine and a half inches above the surface of the basin. Yet this experiment, so simple and so convincing, and which now appears to every man in the least acquainted with natural philosophy, to prove beyond a doubt, that it is the pressure of the atmosphere which holds fluids in equilibrium, at certain heights, according to their specific gravities, was opposed by the greatest number of the learned of the time. It was written against, debated and disputed, and the supporters of this new discovered truth, had great difficulty in gaining belief; but it being found that when the tube was carried to the top of a high mountain, the mercury stood lower than on the plain, and that in the vacuum of the air-pump it fell altogether, then

the discovery of Torricelli began to be generally acknowledged. Thus it is that the minds even of the learned, long associated with what are considered as established principles, adopt with difficulty new discoveries.

“About the year thirteen hundred and twenty, Bartholomew Schwartz is said to have invented gunpowder. It was not till the beginning of the fifteenth century, that is one hundred and fifty years after the invention of cannon, that iron balls were used. Perhaps Schwartz, when he invented powder, never thought that his discovery would change the whole art of war. Muskets were not used till the year fifteen hundred and twenty-one: that is two hundred and one years after the invention of powder. The Spaniards first armed their foot soldiers in this manner. They used match-locks. Firelocks were not used till the beginning of the seventeenth century; that is one hundred and eighty years after muskets were invented. Even then the great Marshal Saxe had so

little confidence in the efficacy of a flint, that he ordered a match-lock to be added to the lock with a flint, lest the flint should miss fire. Such is the force of habit on the human mind.

“In the year sixteen hundred and sixty-three, the Marquis of Worcester discovered the expansive power of steam. Thirty-three years afterwards, Captain Savary took out a patent for a steam-engine, to pump the mines of Cornwall. In seventeen hundred and five, Mr. Newcomen thought of a piston to the cylinder; but he worked at it nine years before it was sufficiently improved to give a fair prospect of utility. Fifty-two years after Mr. Newcomen's discovery, Mr. Watt thought of another improvement, which was the separate condenser. Thus it was a hundred years from the time of the Marquis of Worcester, till Mr. Watt's discovery gave the steam-engine, in any degree, its present perfection; and rendered it so simple, familiar,

and useful, as to be adapted to the many important purposes to which it is now applied.

“Such is the opposition to, and progress of inventions in general, however simple their principles and important their use.

“Can it be denied, that the submarine system of warfare presents as fair a prospect of being rendered practicable and useful, as either of the inventions before-mentioned did in their infancy?”

We think that every candid and unprejudiced mind must answer, to this question of Mr. Fulton, agreeably to what was evidently his anticipation.

After the conclusion of these experiments, he does not appear to have turned his attention to torpedoes, or submarine explosions, until the late war was declared between Great Britain and the United States.

His mind was engaged by other great and interesting objects. He had in the meantime brought his system of navigation by steam to such perfection, that steam-boats were established and running as regular packets upon the Hudson, between New-York and Albany, and as ferry-boats across the bays and rivers. He also became an active member of a commission appointed by the legislature of the State of New-York, for making the great canal, from the western lakes, or inland seas, on the confines of our territory, to the waters of the Hudson.

Very soon after his arrival in this country, he was elected a director of the American Academy of Fine Arts; a member of the New-York Historical, and of the United States' Military Philosophical Societies; and, upon the organization of the Literary and Philosophical Society of New-York, he was chosen one of its original fellows.

We must now revert to an early period of Mr. Fulton's life, to trace from the beginning the progress of that great improvement in the arts, for which we and all the world are so much indebted to him: we mean the practical establishment of navigation by steam.

At what time his attention was first directed to this subject I do not know; but it is ascertained that, in the year seventeen hundred and ninety-three, he had matured a plan in which, even at that early day, he had great confidence. The evidence of this is his letter to the Earl of Stanhope, to which I have before adverted. This letter is dated the thirtieth of September, seventeen hundred and ninety-three. The answer from Lord Stanhope is dated the seventh of the following October, at Holdsworth, Devon, and is as follows: "Sir, I have received your's of the thirtieth of September, in which you propose to communicate to me

the principles of an invention, which you say you have discovered, respecting the moving of ships by the means of steam. It is a subject on which I have made important discoveries. I shall be glad to receive the communication which you intend, as I have made the principles of mechanics my particular study," &c.

I have been the more particular in noticing this letter from Lord Stanhope, because it is a document which precludes all controversy as to Mr. Fulton's having turned his attention to steam-boats previously to its date; a fact which could not have been disputed, as it has been, if Mr. Fulton, at the time when it so much concerned his interest, could have laid his hands upon the letter of Lord Stanhope, which is now before me, and which has fortunately survived the shipwreck that has been before mentioned. It was accidentally found in a mass of Mr. Fulton's mutilated manuscripts after his death, and it is very

probable that he did not know it was in his possession. The frank and post-mark, as well as the hand-writing and signature, can leave no doubt of its authenticity.*

* Mr. Fulton's testimony, in relation to his correspondence with Lord Stanhope, when he was examined before the legislature of New-Jersey upon an application by the adversaries of Mr. Livingston, for a repeal of what were called the retaliatory laws of that state, has been made a subject of the basest calumnies. This induced us to apply to Mr. Emmet, who appeared at the bar of the house of Assembly, as counsel for the petitioners against the repeal. We are happy to have it in our power, so amply to vindicate the character of Mr. Fulton, as is done by a letter from Mr. Emmet to Mr. Fulton's present biographer, which is as follows:

“ July 15, 1815.

“ MY DEAR SIR,

“ In answer to your question respecting an insinuation which has reached your ears, derogatory to our late much esteemed and valuable friend, Mr. Fulton, I shall give you a very plain statement of the transaction from which it has originated.

“ In order to show Mr. Fulton's prior claim, to invention in the application of water-wheels to steam-boats, I produced and examined him to prove a copy of a letter written by him to Lord Stanhope, accompanied with drawings. His own name, with the name of an attesting witness, and the date in seventeen hundred and ninety-three, were written at the foot of the drawings, one of which I referred to as a proof of my assertion. I examined Mr. Fulton, who proved in general terms, that it was a copy of a letter he had written and sent to Lord Stanhope at that period, and that the signature by himself and

It is impossible to say how far Mr. Fulton turned his attention to this subject, what experiments, or what degree of progress he

the attesting witness were genuine, and written at that time. Not having myself the least suspicion but that the copy of the letter itself was equally ancient, I asked nothing particularly about it, and pointed no question calculated to excite Mr. Fulton's attention to the fact which he subsequently disclosed; nor do I recollect any question from the opposite side, which ought to have had that effect. The letter having been read and the drawing exhibited, we proceeded to some other part of our case, and while it was going on, Mr. Fulton whispered to me that there was a circumstance respecting Lord Stanhope's letter, which had escaped his memory, and perhaps ought to be explained. That the drawings were the very original drawings which he had made at Torbay, in seventeen hundred and ninety-three; but that the copy of the letter was not. That the first copy having been considerably worn out and obscured, he had some time ago copied it over again, and attached it to the old drawings. I solemnly assure you, that before Mr. Fulton stated this to me, I did not, and I firmly believe Mr. Fulton did not, observe any thing in the conduct or examination of the letter and drawings by the opposite party, to excite apprehension or suspicion that any discovery had been made. I directly got up and stated the fact to the assembly, and asked its permission to re-examine Mr. Fulton on that point, which I did, and he told the story as I have given it to you. When he had done, Governor Ogden, in a very gentlemanly manner, said he was extremely glad Mr. Fulton had given that explanation, as he had discovered the letter was written on American paper. From his manner and his expressions, I had no doubt but that he was perfectly satisfied with the explanation, and so in truth I imagined was every one present. No more was thought about it till Mr.

had made in his plans for steam-boat navigation, previously to the year eighteen hundred and one, when he and Chancellor Livingston

Hopkinson introduced it into his speech, in a manner which I confess surprised me; but I was still confident that his insinuations could make no impression on those who had themselves witnessed the transaction, and seen the mode and manner of Mr. Fulton's explanation: indeed very much owing to that confidence, I omitted in my reply to notice the insinuations Mr. Hopkinson permitted himself to make. Perhaps, also, I should attribute that omission to the outraged state of my own feelings, which occupied more of my thoughts at the moment, than an advocate can excuse on cool reflection. However, I have never ceased to regret the omission, since I have learnt the perverted statement which malice and selfishness have sought to give of the transaction; and believe me, there never was a more vilely malicious attempt to injure the character and honour of the dead, than the propagation of the falsehood to which your letter alludes.

"I am, my dear Sir, with very

"Sincere regard, your friend and

"Humble servant,

"THOS. ADDIS EMMET.

"*Cadwallader D. Colden, Esq.*"

But if any thing further is wanting on this subject, we may refer to Mr. Fulton's Treatise on Canal Navigation, which we have before noticed. He commences his introduction to that work, with a reference to his correspondence with the Earl of Stanhope in seventeen hundred and ninety-three. After stating that he had contrived a machine for transporting boats and their cargoes to and from different levels, he then has these words: "having some communication with his lordship on the practica-

met in Paris. Among his papers are a variety of drawings, diagrams, and innumerable calculations, which evidently relate to the subject; but they are imperfect; most of them are mutilated by the accident before mentioned; and they are without dates, so that they cannot with certainty be assigned to any period. They render it very evident, however, that the application of water-wheels, as they are now used in the boats which he built in this country, were among his first conceptions of the means by which steam-vessels might be propelled.

The history of the discovery of the power of steam, and of its application to engines which have been made for its use, and the progress of their improvement, might be

bility of navigating vessels by steam, I sent him a sketch of my plan: His lordship in his answer, was pleased to compliment me on the thought," &c. If it be recollected that this work of Mr. Fulton was published in London in seventeen hundred and ninety-six, that is, nearly twenty years before the controversy in New-Jersey, it must appear a piece of testimony that will carry conviction to every unprejudiced mind.

very interesting, but would be inapplicable here. Mr. Fulton had indeed given Messrs. Watt and Bolton, instructions constructing the first engine which was successfully used in a boat, and had directed parts to be made so that it might be ranged in a manner, and within a compass suited to his purpose, which no one without less mechanical genius than himself, would have been able to do as accurately as it was done by him; yet he made no pretensions as an inventor with respect to the engine. On the contrary, he has been often heard to declare, that he did not pretend himself to have made, and he did not know of any improvement that had been made by any other person, upon engines which were constructed according to Mr. Watt's principles. But the pretensions of those who were envious of his fame, and greedy for his profits when they had witnessed his success, who have obtained patent after patent, which they have made the foundations of endless, vexatious suits, and proceedings against him and

his heirs, were often grounded on matter of no more importance than a new arrangement of some subordinate part of the engine, or trifling alteration in some link of the machinery used by Mr. Fulton. A variance in the shape or disposition of the boiler, something new in the make of the fire-place, or things of as much moment were, in the estimation of the contrivers, and of those whom the laws have constituted the immediate guardians of mental property, sufficient to give them claims as inventors, in their own opinions transcending Mr. Fulton, and entitling them to contest his right to privileges which were granted to him as a reward for his genius, his enterprise, his expenses, and years of indefatigable industry and perseverance.

Nor will the nature or limits of this address permit us to examine with any minuteness, the pretensions of those who claim to have preceded him in the application of steam to navigation. That it was not suc-

cessfully accomplished by any one prior to the execution of his plan, seems to be proved by the acknowledged fact, that though in several instances boats had been made to move by the force of steam, yet not one, either in Europe or America, had ever answered any other purpose than to prove an unsuccessful experiment. If steam-boats had ever before been constructed so near perfection as to show that they might be used with their present advantage; can it be believed that they would have been subsequently abandoned? It is as reasonable to suppose that a man would live in want, if he possessed the power of transmuting metals.

It is very true, that some ingenious attempts to propel boats by steam, had been made long before Mr. Fulton thought of it, or rather before the time when we know that he had thought of it. Indeed, it is natural to suppose, that the possibility of applying this power to so desirable an object as navigation, would be one of the first thoughts

that would occur, when it was seen that it might be made to move machinery. From that time to this, there have been many projectors, some of them ingenious and respectable; but most of them ignorant and impudent: In none of those, however, who have attempted this great object, were united those qualities and acquirements to which Mr. Fulton owed his success: That is to say, a genius for invention, mathematical and philosophical science, mechanical knowledge, and what is rare in combination with these, considerable practice.

Mr. Fulton, when he conceived a mechanical invention, not only perceived the effect it would produce, but he could ascertain by calculation, the power his combination would afford; how far it would be adequate to his purpose, and what would be the requisite strength of every part of the machine. And though his numerical calculations did not always prove exact, and re-

quired to be corrected by experiment; yet they assured him of general results.

None of the projectors prior to him whose claims have been set up to rival his, have left any traces of calculations, or even any account of the principles upon which their machines were contrived. They were among the multitude who thought that steam might be applied to navigation. They sat to work to form a machine, upon a crude notion, that it might be made to do something, without having attempted to calculate what, and without having any precise plan for its execution: when it did not answer their expectations, it was abandoned, because they could not perceive the cause of its failure, or any mode of making improvements upon it.

On the contrary, he never attempted to put in practice any improvements in mechanics, without having made his calcula-

tions, drawn his plans, and executed his models.

A view of the progress of his improvements, as they are to be traced from the calculations, drawings, and notes on experiments, which he has left, would afford the most useful lessons; and a work which would give them to the world in a proper manner, would be invaluable. It would show that many of the contrivances for which claims are now made as for new inventions, because they differ from what he used, occurred to him, and were rejected after consideration and experiment; because he found them inferior to those he finally adopted.

It is remarkable that the persons who have been most disposed to question the claim of Mr. Fulton, as the first who brought navigation by steam to be practically useful, are precisely those who have been utterly

unsuccessful in their own attempts : and it would seem that, exactly in proportion as their efforts were abortive, and as they had thrown away money in fruitless experiments, their claims rose in their own estimation, and that of their partisans. The pretensions of the constructors of steam-boats which could be of no use, and which on that account were abandoned, have been considered by some, as equal at least, if not superior, to the merits of the man who attained the most complete success.

It was not merely the claims of individuals which were founded on this basis ; nations, ambitious of the honour of an improvement so beneficial to mankind, made pretensions on no other foundation.

The French contend that the Abbé Arnauld, in the year seventeen hundred and eighty-one, proposed to apply the power of a steam-engine on board a vessel.

The English found their claim on a variety of abortive experiments; but we may judge of the whole, by the account we have of the last which were made prior to Mr. Fulton's exhibition on the Seine. We are told that about the year eighteen hundred, Messrs. Hunter and Dickinson took out a patent in England, for propelling vessels by steam, which was tried on the Thames, in January, eighteen hundred and one. And though these gentlemen, it is to be presumed, had the advantage of knowing what had been previously attempted in England by the Earl of Stanhope, by Mr. Thompson, and by Mr. Walker; yet it is mentioned in the English Monthly Magazine, which gives an account of this performance, as very creditable to them, and as exceeding every thing before accomplished; that the vessel was moved at the rate of three miles an hour through the water.

The Scotch found a claim on an experiment which was made in that country in the

same year. A steam-boat was there constructed, which it is said drew three vessels of sixty or seventy tons burden each, at the rate of two and a half miles an hour, on the Forth and Clyde canal.

It may be well to contrast these performances with what we have all seen one of the Fulton boats perform: The Paragon, which is herself three hundred and thirty-one tons burden, towed the steam-frigate Fulton, which is of the burden of two thousand four hundred and seventy-five tons, from the ship-yards, in the Sound, where she was launched, to the dock at the city of Jersey, on the Hudson, where she was to receive her machinery; at the rate of four miles an hour.*

* Steam-boats have multiplied with great rapidity in Great Britain since eighteen hundred and twelve, when one was put in successful operation on the Clyde; yet if we may judge from a recent publication in Scotland, purporting to be, "A Treatise on Propelling Vessels by Steam," the principles of this art are not well understood by the British. In the little that there is in this work, which particularly regards

No attempt that deserves notice, has ever been made in our own country upon which any claim, adverse to Mr. Fulton's, has

steam navigation, we may notice the following very important mistake: "It would probably be found of advantage," says the author, "to have a power of changing the velocity of the paddle-wheels according to the circumstances of the current; for when the boat goes with the current, (the velocity of the paddles remaining the same in both cases,) the paddle enters the water comparatively at rest; whereas when the boat goes against the current, the water is going in the direction of the motion of the paddle with great velocity." This last position, as the author unquestionably means it to be understood, is very true, but the mistake is in supposing that the current is passing the boat. In reference to the boat or paddles, the water, with whatever velocity it may run over the bottom, or by the land, is always stagnant, as much so as it is in relation to a chip or other body floating on its surface; so that the current cannot accelerate or retard the paddles, and any power to change their velocity, would be much worse than useless.

It would seem from this work, that an Englishman conceived some idea of a steam-boat, nearly eighty years ago. Mr. Buchannan, the author of the treatise we have mentioned, says that a correspondent of his informed him, that a pamphlet was published in the year seventeen hundred and thirty-seven, by Jonathan Hull, of London, under the title of "A Description and Draught of a new invented Machine for carrying Vessels or Ships out of, or into, any Harbour, Port or River, against Wind or Tide, or in a Calm."

Mr. Buchannan gives, as an extract from this pamphlet, a description of the mechanism employed. But this is merely the description of the earliest atmospheric steam-engines, and their

been pretended, except one, of which a Mr. Fitch, a very ingenious mechanic, was the projector, and which was made on the Delaware, in the year seventeen hundred and eighty-three, subsequently, it will be observed, to the experiment of the Abbé Arnauld : so that if Mr. Fulton is not entitled to be

power, which, when applied to proper instruments, the author of the pamphlet says, " must drive a vessel with great force."

From this expression it is to be presumed, that this is a mere project, and that no attempt was made to execute it. Yet certainly if any other than Mr. Fulton is entitled to the credit of being the inventor of steam navigation, it must be this Mr. Jonathan Hull : for he seems to have come as near to the ideas of a perfect steam-boat, as any of the succeeding unsuccessful projectors ; and among these, as being the oldest, he is certainly entitled to the highest rank.

But Mr. Buchannan very candidly admits, that Mr. Fulton is entitled to the merit of having been the first who contrived the means of usefully applying the power of steam to navigation, which is all that Mr. Fulton ever claimed : Mr. B. says, " In eighteen hundred and seven, Mr. Fulton of New-York, introduced steam-boats in America ; which were the first that succeeded in a profitable way."

This gentleman saw the vessel which was constructed by Lord Stanhope in seventeen hundred and ninety-five. He appears to have taken great pains to inform himself as to the origin and progress of steam-boats. The admission of Mr. Fulton's claims by a Briton, thus circumstanced, cannot be unimportant.

considered as the inventor of steam-boat navigation, because he was not the first to think of it, for the same reason, Mr. Fitch cannot have that merit.

Mr. Fitch's boat was propelled by paddles and not by wheels.

Mr. Fitch was supported by an association of wealthy men, who themselves witnessed the performance of his boat, who had advanced large sums of money, which were expended upon her, and the reimbursement of which depended on her successful operation. There was at least one of this association, who would not be pleased to be considered in any, but the first rank of mechanics; yet this vessel and the project were entirely laid aside, after the vessel had been moved by her machinery, several times for some distance up and down the Delaware river. It must be remarked, that this abandonment was made by Mr. Fitch and his associates, after he had obtained an exclusive right to

navigate not only the waters of the State of Pennsylvania, but of this state, and of several other states in the union. Was this experiment of Mr. Fitch and his associates, or any of the British experiments, successful? If they were, how came they to be abandoned? How comes it that for years and years they were not thought of, and that the memory of them was not revived, until after Mr. Fulton's boats were seen in successful operation?

There is another fact, in relation to Mr. Fitch's boat, which it would seem must be a conclusive answer to any thing that can be urged in his behalf, in opposition to Mr. Fulton's claims, in regard to the practical introduction of steam navigation.

Mr. James Rumsey, an extremely ingenious American, who knew well all that Fitch had done, and had been engaged in a controversy with him in this country, relative to the boat built on the Delaware,

some time after Mr. Fitch had relinquished, or abandoned his project, went to London. With the pecuniary aid of a wealthy American, and several monied men, he built a steam-boat on the Thames. She was to be propelled by the engine's working a vertical pump in the middle of the vessel, by which the water was to be drawn in at the bow, and to be expelled at the stern, through an horizontal trunk in her bottom. But this boat was in her turn abandoned without ever having been in successful operation. Can it be believed, that if Mr. Fitch had constructed a steam-boat that was capable of performing to any useful purpose, Mr. Rumsey would have so entirely failed? or that if he had seen the successful operation on the Delaware, of such water-wheels as are now used on the Fulton boats, he would afterwards have resorted to the unpromising means of propelling his boat, which he adopted?

But, perhaps, the most satisfactory evidence of the success which attended these

attempts, will be found in a communication of a gentleman of science, who had the best opportunities of knowing what had been done in America on this subject, and who was called upon for information in relation to it, at a time when neither interest, jealousy, nor controversy, could have created prejudice or bias.

A society in Rotterdam had applied to the American Philosophical Society, to be informed whether any, and what improvements had been made in the construction of steam engines in America. The subject was referred to Mr. Benjamin H. Latrobe, who on the twentieth of May, eighteen hundred and three, read to the Philadelphia Society a report, from which, as it is recorded in their Transactions, the following are extracts:

“ During the general lassitude of mechanical exertion, which succeeded the American revolution, the utility of steam-engines appears to have been forgotten; but the sub-

ject afterwards started into very general notice, in a form, in which it could not possibly be attended with much success. A sort of mania began to prevail, which indeed has not yet entirely subsided, for impelling boats by steam-engines. Dr. Franklin proposed to force forward the boat by the immediate action of the steam upon the water. Many attempts to simplify the working of the engine, and more to employ a means of dispensing with the beam, in converting the libratory into a rotatory motion, were made. For a short time a passage boat, rowed by a steam engine, was established between Bordentown and Philadelphia; but it was soon laid aside. The best and most powerful steam engine which has been employed for this purpose (excepting perhaps one constructed by Doctor Kinsey, with the performance of which I am not sufficiently acquainted,) belonged to a few gentlemen of New-York. It was made to act, by way of experiment, upon oars, upon paddles, and upon flutter-wheels: nothing in the success of any of

these experiments appeared to be sufficient compensation for the expense, and the extreme inconvenience of the steam-engine in the vessel.

“There are, indeed, general objections to the use of the steam-engine for impelling boats, from which no particular mode of application can be free. These are:

“First—The weight of the engine and of the fuel.

“Second—The large space it occupies.

“Third—The tendency of its action to rack the vessel, and render it leaky.

“Fourth—The expense of maintenance.

“Fifth—Their regularity of its motion, and the motion of the water in the boiler and cistern, and of the fuel-vessel in rough water.

"Sixth—The difficulty arising from the liability of the paddles or oars to break, if light, and from the weight, if made strong.

"Nor have I ever heard of an instance, verified by other testimony than that of the inventor, of a speedy and agreeable voyage having been performed in a steam-boat of any construction.

"I am well aware, that there are still many very respectable and ingenious men, who consider the application of the steam-engine to the purpose of navigation, as highly important and as very practicable, especially on the rapid waters of the Mississippi; and who would feel themselves almost offended at the expression of an opposite opinion. And perhaps some of the objections against it may be avoided. That founded on the expense and weight of the fuel, may not, for some years, exist on the Mississippi, where there is a redundancy of wood on the banks;

but the cutting and loading will be almost as great an evil.”*

After this testimony, it is impossible now to make it be believed that either Fitch or Rumsey constructed a steam-boat which was capable of being advantageously used, and that they abandoned their projects after they had been accomplished, for want of patronage, or pecuniary assistance. Mr. Fitch and Mr. Rumsey were unquestionably very ingenious and enterprising mechanics: they saw, as thousands of others have seen, since the power of steam has been known, that it might be applied to navigation; but they did not know how to make the application. Like many other projectors who have followed them, they wanted that rare union of genius and science, with *practical knowledge*, which Mr. Fulton so happily possessed. These qualities separately employed, have been the parents of a million of absurd and abortive at-

* Transactions of the American Philosophical Society, vol. 6. part 1st, p. 90, 91.

tempts in every branch of mechanics. The man of genius and science may amuse himself with inventions and calculations; but his best theories may fail if he does not know how they should be executed. On the other hand, the mere practical mechanic often relies on his capacity to combine the powers with which his daily employment makes him familiar; and he sets about constructing a machine, which he persuades himself will answer to his wishes, though he can make no calculation as to its power or the effect it is to produce, and is not able to explain a single principle on which it is to act.

It would be well if every mechanical projector would bear in mind, that with respect to the mechanical powers, nature has no secrets; they never can perform any thing that may not be anticipated by calculation, without experiment or the necessity of models: and unless it can be demonstrated by figures, that any proposed combination of machinery when acted upon by a given

power, will produce the desired effect, the project must be fallacious. If we look into our patent office, we may be disposed to believe, that many of the projectors who have deposited models in the repository, have thought, as the heathen did, that their wheels might be set in motion by calling on Hercules.*

It is to this uncommon union, we repeat, of capacities to invent, to calculate, and to execute, that Mr. Fulton owed his success: and those who attempted similar projects, without possessing the same qualities, might have exhausted their lives and fortunes and not have accomplished their wishes. So great a triumph of the arts as steam-boat navigation, could never have been attained till some Fulton appeared to achieve it.

There have been undoubtedly others to whom we have not particularly adverted,

* A patent of the biographer's is by no means an exception to these general remarks ; but "experience teacheth."

who pretended to have superior merits, either as inventors or improvers of steam-boats:—as to the first, it is enough to say, that whatever ideas they may have had, none of them did any thing practical, or showed how it might be done. As to the last, their pretensions have uniformly been founded on slight aberrations from Mr. Fulton's plans, after they had been seen in successful operation.

In this country, laws for securing mental property, are comparatively novelties. They meet with but little of the respect paid to those, which guarantee the enjoyment of our more substantial and visible acquisitions. We are not accustomed to the exercise of exclusive privileges of this nature. It is not difficult for the artful and avaricious to make it be believed that they are unmerited and odious monopolies; or for an ambitious demagogue to persuade a multitude that the adversary of exclusive rights is their friend. While by these means he courts popularity,

he at the same time gratifies envy and jealousy of the success and prosperity of others, not uncommon in little and illiberal minds. Very many think that there is no injustice in attacking, or attempting to invade the patents and grants made to Mr. Fulton. On the contrary, if the letter of the law can be evaded by any subterfuge, they think it would be meritorious to do it. They consider his privileges as fair objects of plunder; and have no hesitation in endeavouring to rob him of them, under the most frivolous pretences. Foreign as well as native adventurers, who have been willing to rescue themselves from poverty and obscurity by any means, have set up for men of genius and invention, and have hoped to share his fame by taking a patent, and to gratify their cupidity by invading his rights. Innumerable patents for steam-boats or some part of the machinery have been taken out of the office at Washington, since Mr. Fulton's boat began to run in eighteen hundred and seven on the Hudson river: and yet there is not one of

them that can be said to be for an useful improvement. The evidence of this, is that none of them, unless it be such as are obviously copies from Mr. Fulton, with some slight change as to form or proportion, are in use.

In speaking of what had been done in this country prior to the running of his boats, it would be great injustice not to notice, with due respect and commendation, the enterprises of the late Chancellor Livingston, who had so intimate a connexion with him, in the progress and establishment of this great public benefit.

While Mr. Livingston devoted much of his own time and talents to the advancement of science, and the promotion of the public good, he was fond of fostering the discoveries of others. The resources of his ample fortune were afforded with great liberality, whenever he could apply them, to the support and encouragement of genius.

He entertained very clear conceptions of what would be the great advantages of steam-boats, on the large and extensive rivers of the United States. He had applied himself with uncommon perseverance, and at great expense, to constructing vessels and machinery for that kind of navigation. As early as seventeen hundred and ninety-eight, he believed that he had accomplished his object, and represented to the legislature of the state of New-York, that he was possessed of a mode of applying the steam-engine to propel a boat on new and advantageous principles; but that he was deterred from carrying it into effect, by the uncertainty and hazard of a very expensive experiment, unless he could be assured of an exclusive advantage from it, should it be found successful.

The legislature, in March seventeen hundred and ninety-eight, passed an act, vesting Mr. Livingston with the exclusive right and privilege of navigating all kinds of boats,

which might be propelled by the force of fire or steam, on all the waters within the territory or jurisdiction of the state of New-York, for the term of twenty years from the passing of the act; upon condition that he should within a twelvemonth build such a boat, the mean of whose progress should not be less than four miles an hour.

The bill was introduced into the house of assembly by our learned associate Doctor Mitchill, he then being a representative from this city. "Upon this occasion," says Doctor Mitchill in a letter with which he has favoured me, "the wags and the lawyers in the house were generally opposed to my bill. I had to encounter all their jokes, and the whole of their logic. One main ground of their objection was, that it was an idle and whimsical project, unworthy of legislative attention."

A venerable friend,* who was a mem-

* The late Senator L'Hommedieu.

ber of the senate at that time, has described the manner in which this application from Mr. Livingston was received by the legislature. He said it was a standing subject of ridicule throughout the session, and whenever there was a disposition in any of the younger members to indulge a little levity, they would call up the steam-boat bill, that they might divert themselves at the expense of the project and its advocates.

Mr. Livingston, immediately after the passing of this act, built a boat of about thirty tons burden, which was propelled by steam; but as she was incompetent to fulfil the condition of the law, she was abandoned, and he for the time relinquished the project.

Though Mr. Livingston, previously to his connexion with Mr. Fulton, had done more than any other person towards establishing steam-boats, and though his experiments had been more expensive, and more successful,

than any we have heard of, yet he was not among those who founded, on their fruitless attempts, a claim to be the inventors of navigation by steam, and whose opposition to Mr. Fulton has been very generally in proportion to the variety and ill success of their schemes. The worst project has generally been the most expensive, and on that account, the worst projector seems to have considered his claim as the highest.

On the contrary, Mr. Livingston availed himself, every opportunity, of acknowledging Mr. Fulton's merits; and when he was convinced that Mr. Fulton's experiments had evinced the justness of his principles, they entered into a contract, by which it was, among other things, agreed, that a patent should be taken out in the United States in Mr. Fulton's name, which Mr. Livingston well knew could not be done without Mr. Fulton's taking an oath that the improvement was solely his.

In the American Medical and Philosophical Register, there is a piece published under the title of "An Historical Account of the Application of Steam for the Propelling of Boats." This was drawn up by Mr. Livingston, and addressed to Doctors Hosack and Francis, the editors of that journal. He very candidly acknowledges that all his efforts had been unavailing. He explains the nature of the connexion between him and Mr. Fulton; and shows what part that gentleman performed in the experiments which led to the accomplishment of their object. As this account, from Chancellor Livingston himself, must be very satisfactory, we shall present a part of it in an extract from the learned and valuable work we have just mentioned.

"Robert R. Livingston, Esq. when minister in France, met with Mr. Fulton, and they formed that friendship and connexion with each other, to which a similarity of pursuits generally gives birth. He communicated to Mr. Fulton the importance of steam-boats to

their common country; informed him of what had been attempted in America, and of his resolution to resume the pursuit on his return, and advised him to turn his attention to the subject. It was agreed between them to embark in the enterprise, and immediately to make such experiments as would enable them to determine how far, in spite of former failures, the object was attainable: the principal direction of these experiments was left to Mr. Fulton, who united, in a very considerable degree, practical, to a theoretical knowledge of mechanics. After trying a variety of experiments on a small scale, on models of his own invention, it was understood that *he* had developed the true principles upon which steam-boats should be built, and for the want of knowing which, all previous experiments had failed. But as these two gentlemen both knew, that many things which were apparently perfect when tried on a small scale, failed when reduced to practice upon a large one, they determined to go to the expense of building an operating boat

upon the Seine. This was done in the year eighteen hundred and three, at their joint expense, under the direction of Mr. Fulton; and so fully evinced the justice of his principles, that it was immediately determined to enrich their country by the valuable discovery, as soon as they should meet there, and in the mean time to order an engine to be made in England. On the arrival at New-York of Mr. Fulton, which was not till eighteen hundred and six, they immediately engaged in building a boat of, what was then considered, very considerable dimensions.

“ This boat began to navigate the Hudson River in eighteen hundred and seven; its progress through the water was at the rate of five miles an hour.

“ In the course of the ensuing winter, it was enlarged to a boat of one hundred and forty feet keel, and sixteen and a half feet beam. The legislature of the state were so fully

convinced of the great utility of the invention, and of the interest the state had in its encouragement, that they made a new contract with Mr. Livingston and Mr. Fulton, by which they extended the term of their exclusive right, five years for every additional boat they should build; provided the whole term should not exceed thirty years; in consequence of which, they have added two boats to the North River boat; (besides those that have been built by others under their license,) the Car of Neptune, which is a beautiful vessel of about three hundred tons burden, and the Paragon of three hundred and fifty tons, a drawing of which is sent you herewith, together with a description of her interior arrangements.”*

We have seen that Mr. Fulton's mind, previously to his return to this country, had long been directed to the project of propel-

* American Medical and Philosophical Register, vol. II. p. 260-262.

ling boats by steam: we know that prior to seventeen hundred and ninety-three, he had exercised his thoughts on this subject. We see by his letter to Lord Stanhope of that date, that he had then matured a plan, of which he speaks with confidence that it would be successful. Upon Chancellor Livingston's arrival in France, he was induced to revive his thoughts of this invention, by Mr. Livingston's representations of the incalculable advantages which would be derived from navigation by steam in this country, by his account of the approaches to success which he had made in his experiments, and by the pecuniary support which the Chancellor's wealth enabled him to offer. Mr. Fulton began a course of calculations upon the resistance of water, the necessary force to move a body through it, upon the most advantageous form of the body to be moved, and upon the different means of propelling vessels which had been previously attempted.

Doctor Franklin had taken up an idea, which had been previously suggested by Bernoulli, and was probably borrowed by him from the Abbé Bossat's* experiments on mills, that a boat might be propelled by forcing a column of water through a channel for that purpose in her keel, out at her stern. This was the plan, as we have before mentioned, which Mr. Rumsey, after he had seen the failure of Fitch's paddles, adopted for the steam-boat which he constructed on the Thames: But Mr. Fulton, after a variety of calculations, came to an opinion that this was the worst of all the modes which had been proposed.

He then thought of paddles, and ducks' feet: and concludes his calculations and observations on them as follows: "In fact, when it is considered for a moment, that it is absolutely necessary, that a paddle of six feet surface should move in the water at the rate of sixteen miles an hour, which is twenty-

* *Traits de l'Hydrodynamique,*

three feet a second, to drive a boat of given dimensions eight miles an hour, the difficulty of producing such a movement by paddles, or oars, or by driving water out at the stern of the boat, or by any contrivance that requires a retrograde movement, such as ducks' feet, which open as they are pushed out, and shut as they are drawn in, to make a second stroke, will be found to be very great. I believe it will be impossible to drive a boat six miles an hour by any method like these: and it appears to me, that it has been owing to such defective applications of power, and not to a want of it in the steam-engine, that all experiments hitherto made, to apply it to navigation, have failed."

Mr. Fulton then took up the idea of using endless chains, with resisting boards upon them, as propellers: his calculations gave him a favourable opinion of this mode, at least he was persuaded it was greatly preferable to any other method which had been previously tried; but he was desirous

of proving their effects by actual experiment, for which he wished more retirement than the waters near Paris would afford. Mrs. Barlow in the spring of eighteen hundred and two, having been ordered by her physicians to Plombieres, Mr. Fulton accompanied her; and on a little rivulet which runs through that village, he made a course of experiments, with a set of ingenious models which he had constructed for the purpose. In June, eighteen hundred and two, he addressed several letters to Mr. Livingston and Mr. Barlow, giving them a minute account of his experiments, and assurances of the certainty of success which they afforded him. The ingenuity of the little working models which he employed on this occasion, the simplicity of his contrivances, his calculations and demonstrations, are all evidence of his genius, his science, and his practical knowledge. Among the manuscripts he has left, are, diagrams, drawings, calculations, and notes, which fully explain every thing connected with this course of

interesting experiments. It would be greatly to be regretted, not only in regard to his fame, but as respects the arts, if they should not be given to the world in a proper form. This, however, would require different talents from these now employed, and were it otherwise, could not be done on this occasion.

In October, eighteen hundred and two, Mr. Fulton saw a model which had been deposited in the repository of machines, by a French gentleman of the name of Des Blanes, upon which he had taken a patent. He proposed to use a horizontal cylinder, by which endless chains, with resisting boards upon them, or what he called chaplets, were to be worked from stem to stern alongside of the boat. This gentleman made many experiments at a very great expense, without a success which promised any thing useful.

Though his mode of using the chaplets was very different from that proposed by Mr. Fulton; yet it is probable, that Mr. Des

Blanes' want of success induced Mr. Fulton again to revert to wheels, which, in the original project that he communicated to Lord Stanhope in seventeen hundred and ninety-three, he had proposed to use as propellers. In the winter of eighteen hundred and two-three, Mr. Fulton applied the wheels as they are now used, to a working model; and in a memoir, dated the ninth of January, eighteen hundred and three, he has preserved a description of his model, and an account of his various experiments, of the manner in which they were made, of his calculations upon them, and of the results.

At this time, Messrs. Livingston and Fulton were building their experimental boat which was to be propelled by wheels.

On the twenty-fourth of January, eighteen hundred and three, Mr. Fulton deposited with Messrs. Molar, Bordel, and Montgolfier, a model of the boat which was then constructing, and addressed a letter to them ex-

plaining his plan: in this letter he says, "by very exact experiments I have proved, that the wheel is superior to the chaplet;" and he concludes by saying, "Citizens, when the experiments are to be commenced you shall have information, and, when they are finished, should they be successful, I hold myself at liberty to present my labours as a gift to the republic, or to draw such advantage from them as the law allows.

"At present I deposit these notes in your hands, that if any similar plan appears before my experiments are finished, it shall not have a preference to mine."

At about this time, Mr. Des Blanes, who had taken a patent in France for propelling steam-boats by endless chains, and who it is presumed is the French gentleman, alluded to by Mr. Livingston in his historical account of steam-boats, which we have before noticed, complained, by publications in the French journals, that Messrs. Livingston and

Fulton were invading his patent right in the boat they were then engaged in building. He also addressed a remonstrance to Mr. Fulton on the subject; in answer to which, Mr. Fulton explained that his plan differed materially from that of Mr. Des Blanes, and that his boat was to be propelled by wheels, and not by chains. In this letter, to satisfy Mr. Des Blanes, he communicates to him, in the most full and candid manner, an account of his experiments with wheels and chains, and the result that he had found in favour of wheels. He then offers him a share in the advantages of the discovery which he had made, if Mr. Des Blanes would bear a proportion of the expense; but it does not appear that any notice was taken of this letter.

France has lately produced a new competitor, for the credit of being the first to apply steam to navigation successfully.

In March, eighteen hundred and sixteen, a large steam-boat on Mr. Fulton's plan was

established on the Seine by a Mr. Andriel. This has drawn from the Marquis of Juffroy, a severe attack on Mr. Fulton, whom he accuses of having taken from him the idea of a steam-boat, and of having copied one which the Marquis says he constructed at Lyons, in seventeen hundred and eighty-two. The claims of Mr. Fulton are defended with great ability and vivacity by a Mr. Frederick Royou, in a memoir published in the "Journal des Debats," of the sixteenth of March, eighteen hundred and sixteen. Mr. Royou presents the true question. "It is not," says he, "concerning an invention, but the means of applying a power already known. Fulton never pretended to be an inventor in regard to steam-boats in any other sense. The application of steam to navigation had been thought of by all artists; but the means of executing it were wanting, and Fulton furnished them."

Mr. Royou then points out the fallacy and inconsistency of the nobleman's pretensions,

and shows most conclusively, that Mr. Fulton could not have copied from the Marquis, for this very good reason among others, that his plan has most completely succeeded, and the other proved good for nothing.

We learn from this memoir of Mr. Royou, that however individuals of France may be disposed to question his claims as an inventor, or successful improver of steam navigation; the people of that nation are disposed to do him justice, by attaching his name to vessels propelled by steam. Mr. Royou informs us that in France they are commonly called Fulton boats.

It may be well to remark here, that the idea of propelling vessels by water-wheels, which at present are believed to be essential to the success of steam-boats, had occurred to Dr. Franklin; but he rejected them as impracticable, and with his essay read before the American Philosophical Society, referred to by Mr. Latrobe in his answers to the Rot-

terdam Society, which we have before noticed, Doctor Franklin gives a drawing of a water-wheel, accompanied with what he supposes to be a demonstration that they cannot be used to any advantage.

The experimental boat of Mr. Livingston and Mr. Fulton, was completed early in the spring of eighteen hundred and three: they were on the point of making an experiment with her, when one morning as Mr. Fulton was rising from a bed, in which anxiety had given him but little rest, a messenger from the boat, whose precipitation and apparent consternation, announced that he was the bearer of bad tidings, presented himself to him, and exclaimed in accents of despair, "Oh sir, the boat has broken in pieces, and gone to the bottom." Mr. Fulton, who himself related the anecdote, declared that this news created a despondency, which he had never felt on any other occasion; but this was only a momentary sensation. Upon examination, he found that the boat

had been too weakly framed to bear the great weight of the machinery, and that in consequence of an agitation of the river by wind the preceding night, what the messenger had represented had literally happened. The boat had broken in two, and the weight of her machinery had carried her fragments to the bottom. It appeared to him, as he said, that the fruits of so many months' labour, and so much expense, were annihilated; and an opportunity of demonstrating the efficacy of his plan, was denied him at the moment he had promised it should be displayed. His disappointment and feelings may easily be imagined; but they did not check his perseverance. On the very day that this misfortune happened, he commenced repairing it. He did not sit down idly to repine at misfortunes which his manly exertions might remedy, or waste, in fruitless lamentations, a moment of that time in which the accident might be repaired. Without returning to his lodgings, he immediately be-

gan to labour with his own hands to raise the boat, and worked for four and twenty hours incessantly, without allowing himself rest, or taking refreshment; an imprudence, which, as he always supposed, had a permanent bad effect on his constitution, and to which he imputed much of his subsequent bad health.

The accident did the machinery very little injury; but they were obliged to build the boat almost entirely new; she was completed in July: her length was sixty-six feet, and she was eight feet wide. Early in August, Mr. Fulton addressed a letter to the French national institute, inviting them to witness a trial of his boat, which was made in their presence, and in the presence of a great multitude of the Parisians. The experiment was entirely satisfactory to Mr. Fulton, though the boat did not move altogether with as much speed as he expected. But he imputed her moving so slowly to the extremely defective fabrication of the machinery, and to imperfections which were to be

expected in the first experiment with so complicated a machine; but which he saw might be easily remedied.

Such entire confidence did he acquire from this experiment, that immediately afterwards he wrote to Messrs. Watt and Bolton, of Birmingham, England, ordering certain parts of a steam-engine to be made for him, and sent to America. He did not disclose to them for what purpose the engine was intended; but his directions were such as would produce the parts of an engine, that might be put together within a compass suited for a boat. Mr. Fulton then designed to return to America immediately; but as we have seen, he first visited England, and then probably gave new orders on this subject, as the engine which was employed in the first American Fulton boat was of the manufacture of Messrs. Watt and Bolton; but it did not arrive in America till long after the time we are speaking of.

Mr. Livingston also wrote immediately after this experiment to his friends in this country, and through their interference, an act was passed by the legislature of the state of New-York, on the fifth of April, eighteen hundred and three, by which the rights and exclusive privileges of navigating all the waters of this state, by vessels propelled by fire or steam, granted to Mr. Livingston by the act of seventeen hundred and ninety-eight, which we have before mentioned, were extended to Mr. Livingston and Mr. Fulton for the term of twenty years from the date of the new act. By this law, the time for producing proof of the practicability of propelling by steam, a boat of twenty tons capacity, at the rate of four miles an hour, with and against the ordinary current of the Hudson, was extended two years. And by a subsequent law, the time was enlarged to April, eighteen hundred and seven.

Very soon after Mr. Fulton's arrival in this city, he commenced building his first American boat: while she was constructing, he found that her expenses would greatly exceed his calculation. He endeavoured to lessen the pressure on his own finances, by offering one-third of the exclusive right which was secured to him and Mr. Livingston by the laws of New-York, and of his patent rights for a proportionate contribution to the expense. He made this offer to several gentlemen, and it was very generally known that he had made such propositions; but no one was then willing to afford this aid to his enterprise; although so many, since its success, have been eagerly grasping at his profits, and are now, with little principle and little conscience, endeavouring to rob his children of the only patrimony he has left them.

In the spring of eighteen hundred and seven, the first Fulton boat, built in this country, was launched from the ship-yards of

Charles Brown, on the East-River. The engine from England was put on board of her; in August she was completed, and was moved by her machinery from her birth-place to the Jersey shore. Mr. Livingston and Mr. Fulton had invited many of their friends to witness the first trial, among whom were our learned associates Doctor Mitchill and Doctor M'Neven, to whom we are indebted for some account of what passed on this occasion. Nothing could exceed the surprise and admiration of all who witnessed the experiment. The minds of the most incredulous were changed in a few minutes. Before the boat had made the progress of a quarter of a mile, the greatest unbeliever must have been converted. The man who, while he looked on the expensive machine, thanked his stars that he had more wisdom than to waste his money on such idle schemes, changed the expression of his features as the boat moved from the wharf and gained her speed; his complacent smile gradually stiffened into an expression of wonder.

The jeers of the ignorant, who had neither sense nor feeling enough to suppress their contemptuous ridicule and rude jokes, were silenced for a moment by a vulgar astonishment, which deprived them of the power of utterance, till the triumph of genius extorted from the incredulous multitude which crowded the shores, shouts and acclamations of congratulation and applause.

The boat had not been long underway, when Fulton ordered her engine to be stopped. Though her performance so far exceeded the expectations of every other person, and no one but himself thought she could be improved, he immediately perceived that there was an error in the construction of her water-wheels: He had their diameter lessened, so that the buckets took less hold of the water, and when they were again put in motion, it was manifest that the alteration had increased the speed of the boat. It may well be said, that the man of genius and knowledge has a sense, beyond

those which are common to others, or that he sees with different eyes. How many would have gazed on these ill-proportioned wheels, without perceiving that they were imperfect.

This boat, which was called the Clermont, soon after sailed, from a dock near the state prison, for Albany. It is announced in the newspapers of that date, that the boat built by Messrs. Livingston and Fulton, with a view to the navigation of the Mississippi river, from New-Orleans upwards, would depart for Albany in the afternoon. Indeed, this was according to the general impression at the time. For though the performance of this boat had been witnessed in our harbour, yet it was not conceived that steam-boats could be employed as packet-boats between this city and Albany. It is probable that the present success of this mode of navigation, exceeds what was the expectation of Mr. Fulton himself. For though, from the calculations made by him in Paris, he concluded that a steam-boat might be made to run with a speed ex-

exceeding what has yet been attained; yet the experiment in France, and the velocity of the *Clermont*, fell so far short of his estimates, that it is very probable he may have had doubts, after she was put in operation, as to the entire accuracy of his calculations. But every successive experiment showed him, that there were faults in the fabrication of his machinery, and not in his calculations.

From the time the first boat was put in motion till the death of Mr. Fulton, the art of navigating by steam was fast advancing to that perfection of which he believed it capable: for some time the boat performed each successive passage with increased speed, and every year improvements were made. The first boat built by him has invariably been the best, the most convenient, and the swiftest.

The *Clermont* on her first voyage, arrived at her destination without any accident. She excited the astonishment of the inhabitants

of the shores of the Hudson, many of whom had not heard even of an engine, much less of a steam-boat. There were many descriptions of the effects of her first appearance upon the people of the banks of the river: some of these were ridiculous, but some of them were of such a character, as nothing but an object of real grandeur could have excited. She was described by some who had indistinctly seen her passing in the night, to those who had not had a view of her, as a monster moving on the waters, defying the winds and tide, and breathing flames and smoke.

She had the most terrific appearance, from other vessels which were navigating the river, when she was making her passage. The first steam-boats, as others yet do, used dry pine wood for fuel, which sends forth a column of ignited vapour many feet above the flue, and whenever the fire is stirred, a galaxy of sparks fly off, and in the night have a very brilliant and beautiful appearance.

This uncommon light first attracted the attention of the crews of other vessels. Notwithstanding the wind and tide were adverse to its approach, they saw with astonishment that it was rapidly coming towards them; and when it came so near as that the noise of the machinery and paddles were heard, the crews (if what was said in the newspapers of the time be true,) in some instances shrunk beneath their decks from the terrific sight, and left their vessels to go on shore, while others prostrated themselves, and besought Providence to protect them from the approaches of the horrible monster, which was marching on the tides and lighting its path by the fires which it vomited.

Mr. Fulton was himself a passenger on this voyage, and upon his return published an account of it, which deserves to be preserved. It is as follows :

“ To the Editor of the American Citizen.

“ Sir,

“ I arrived this afternoon, at four o'clock, in the steam-boat from Albany. As the success of my experiment gives me great hopes, that such boats may be rendered of great importance to my country, to prevent erroneous opinions, and give some satisfaction to the friends of useful improvements, you will have the goodness to publish the following statement of facts.

“ I left New-York, on Monday, at one o'clock, and arrived at Clermont, the seat of Chancellor Livingston, at one o'clock on Tuesday—time twenty-four hours—distance one hundred and ten miles. On Wednesday I departed from the Chancellor's, at nine in the morning, and arrived at Albany at five in the afternoon—distance forty miles—time eight hours. The sum is one hundred and fifty miles in thirty-two hours—equal to near five miles an hour.

"On Thursday, at nine o'clock in the morning, I left Albany, and arrived at the Chancellor's at six in the evening: I started from thence at seven, and arrived in New-York at four in the afternoon—time thirty hours—space run through one hundred and fifty miles—equal to five miles an hour. Throughout my whole way, both going and returning, the wind was ahead: no advantage could be derived from my sails: the whole has therefore been performed by the power of the steam-engine.

"I am, sir, your obedient servant,

"ROBERT FULTON."

He gives the following account of the same voyage in a letter to his friend, Mr. Barlow:

"My steam-boat voyage, to Albany and back, has turned out rather more favourable than I had calculated. The distance from New-York to Albany is one hundred and fifty miles: I ran it up in thirty-two hours, and down in thirty. I had a light breeze

against me the whole way, both going and coming, and the voyage has been performed wholly by the power of the steam-engine. I overtook many sloops and schooners beating to windward, and parted with them as if they had been at anchor.

“ The power of propelling boats by steam is now fully proved. The morning I left New-York, there were not perhaps thirty persons in the city, who believed that the boat would ever move one mile an hour, or be of the least utility; and while we were putting off from the wharf, which was crowded with spectators, I heard a number of sarcastic remarks. This is the way in which ignorant men compliment what they call philosophers and projectors.

“ Having employed much time, money, and zeal, in accomplishing this work, it gives me, as it will you, great pleasure to see it fully answer my expectations. It will give a cheap and quick conveyance to the mer-

chandise on the Mississippi, Missouri, and other great rivers, which are now laying open their treasures to the enterprise of our countrymen: and although the prospect of personal emolument has been some inducement to me, yet I feel infinitely more pleasure, in reflecting on the immense advantage that my country will derive from the invention," &c.

Soon after this successful voyage, the Hudson boat was advertised and established as a regular passage-boat between New-York and Albany. She, however, in the course of the season, met with several accidents; so many, that those who had been forced to believe that she would succeed, began to return to their former incredulity. It was not wonderful that this first machine should have many imperfections; the greatest of which was, having her water-wheel shafts of cast iron, which was insufficient to sustain the great power applied to them:

The wheels also were hung without any support for the outward end of the shaft, which is now supplied by what are called the wheel-guards: It was obvious that the wheels were likely to give way for want of this simple addition. No one could have seen the operation of the boat without perceiving that this was a defect, and the remedy must immediately have suggested itself to any mechanic; yet many have claimed the invention of this improvement, and have really seemed to think it more meritorious than all Mr. Fulton had done.

His boat and works, and her performance, were open to the inspection of every one. It would have been extraordinary, if the machinery had been so complete as to admit of no improvement: If, like the men of Cadmus, it had been perfect at its birth: and it would have been as extraordinary, if the effects of the machine might not have been produced by an arrangement or combination

of its parts, not precisely according to that which was adopted by Mr. Fulton in his first essay.

Yet, without giving him time or opportunity to make improvements or alterations, men who were greedy of his profits, or envious of his fame, seized upon some trivial or obvious defect, for which they proposed a remedy, or suggested some slight variation in the arrangement of the machinery; and upon these grounds, they contested his right as an inventor, took out patent after patent, and made the highest pretensions for the offsprings of their genius, although any common working mechanic might have been their parent.

But it was not only to accidents arising from defects in the machinery, that the boat was exposed: It was soon perceived that she would interfere with the interest of those, who were engaged in the ordinary navigation of the river. By many of these Mr. Fulton

was spoken of and treated as if he had introduced some project, baneful to society. The boat became an object of their enmity: She was several times greatly damaged by vessels running foul of her, intentionally, if we may credit the testimony which was published in the newspapers of the time.

It is not unimportant to notice these facts; they illustrate the character of Mr. Fulton. They show what embarrassments are to be expected by those, who introduce improvements in the arts, which interfere with established interests or prejudices; and they evince the perseverance and resolution, which were necessary to surmount the physical and moral difficulties which Mr. Fulton encountered.

The legislature of New-York, however, could not be blind to the great advantages of this mode of navigation, nor insensible to the claims, those who had introduced it, had on the public patronage and protection.

At the session of eighteen hundred and eight, a law was passed to prolong, for five years, the exclusive privilege of Mr. Livingston and Mr. Fulton for each additional boat that they should establish; provided that the whole time should not exceed thirty years from the passing of the law.

The spirit of hostility to the boat had so far manifested itself, that the legislature thought it necessary by this act, to declare combinations to destroy her, or wilful attempts to injure her, public offences punishable by fine and imprisonment.

Notwithstanding her misfortunes, the boat continued to run as a packet, always loaded with passengers, for the remainder of the summer. In the course of the ensuing winter she was enlarged: and in the spring of eighteen hundred and eight, she again commenced her run as a packet-boat, and continued it through the season.

On the eleventh of February, eighteen hundred and nine, Mr. Fulton took out his first patent for his inventions in navigation by steam, and on the ninth of February, eighteen hundred and eleven, he obtained a second patent for some improvements in his boats and machinery.

Chancellor Livingston's historical account of steam-boats, which we have before noticed, renders it unnecessary to say more as to the establishment on the Hudson; unless we may add, that four magnificent boats have been built for that river, the largest of which, called the Chancellor Livingston, is of the burden of five hundred and twenty-six tons: These boats are now running as packets between New-York and Albany.

It having been found that the laws, granting to Livingston and Fulton exclusive privileges, were insufficient to secure their enjoyment, the legislature of New-York, in eigh-

teen hundred and eleven, passed a supplementary act, giving certain summary remedies against those who should contravene the protecting laws.

The act, however, excepts two boats which were then navigating the Hudson, and one which ran on Lake Champlain in opposition to Livingston and Fulton: these exceptions were not made by the legislature to countenance this opposition; but because the law, authorizing very prompt and efficient measures, would, as to these boats, have been *ex post facto*, if they had not been excepted: In respect to these, therefore, the parties were left to the same remedies that they might have had before the passing of the last act.

The opposition boats on the Hudson, which the owners had built to rival the steam-boats, were at first to have been propelled by a pendulum, which, according to the calculations of some ingenious gentlemen, would

give a greater power than steam; but when their boat came to be put in the water, they found that their wheels, which were turned with great facility and velocity while their vessel was on the stocks, could not be made to perform their functions without the application of a great power to the pendulum. The projectors were utterly at a loss to account for so extraordinary a phenomenon, and could not conceive why the wheels, which had moved so much to their satisfaction when they were resisted only by the air, should require so much force when they turned in the water, and were to drag the weight of the vessel.

But having by actual experiment determined that a pendulum would not supply the place of steam, and knowing no other way of applying steam than that which they saw practised in the Fulton boats, they adopted all their machinery with some very insignificant alterations, which were made with no

other view than to give those persons who had set out, by professing to make a pendulum boat, a pretence for claiming to be the inventors of improvements on steam-boats.

Messrs. Livingston and Fulton attempted to vindicate their rights, and to stop these boats by an application to the Circuit Court of the United States for an injunction; but the judge decided that he had not jurisdiction of the case. They then made the same application to the Court of Chancery of the State; but the Chancellor, after hearing an argument for several days, refused to grant an injunction. From this decision there was an appeal; and in the winter of eighteen hundred and twelve, the Court of Errors, (which, when the appeal is from Chancery, is composed of the senate of the state, and the five judges of the Supreme Court,) unanimously reversed the decision of the Chancellor, and ordered a perpetual injunction; so that the boats could no more be mov-

ed with steam, than they could by a pendulum.*

In eighteen hundred and eleven and eighteen hundred and twelve, two steam-boats were built under Mr. Fulton's directions as ferry-boats for crossing the Hudson river, and soon after, one of the same description for the East River. Of the former, Mr. Fulton wrote and published a description in the *American Medical and Philosophical Register*, for October, eighteen hundred and twelve.

These boats are what are called twin-boats; each of them being two complete hulls united

* The true merits of the members of this Pendulum Company were happily exposed in the learned, eloquent, and ingenious argument which Mr. Emmet, as counsel for the appellants, made on this occasion before the Court of Errors: In characterizing the members of this Company, and contrasting them with Mr. Fulton, he described them "as men who never wasted health and life in midnight vigils, and painful study; who never dreamt of science in the broken slumbers of an exhausted mind; who bestowed on the construction of a steam-boat just as much mathematical calculation, and philosophical research, as in the purchase of a sack of wheat, or a barrel of ashes."

by a deck or bridge: they are sharp at both ends, and move equally well with either end foremost; so that they cross and re-cross without losing any time by turning about. He contrived, with great ingenuity, floating docks for the reception of these boats, and a means by which they are brought to them without a shock.

In his publication respecting the Hudson River ferry-boats, which we have noticed, he has the following observations: "In a new combination of this kind, it is not to be expected that every thing should work to the best advantage in a first experiment, or that every requisite should be foreseen. The boat which I am now constructing will have some important improvements, particularly in the power of the engine, to overcome strong ebb-tides, from which again, other improvements will be made, as in all other new inventions. The present boat crosses the river, which is a mile and a half broad, when it is calm, in fifteen minutes: the

average time is twenty minutes. She has had in her at one time, eight four-wheel carriages, twenty-nine horses, and one hundred passengers, and could have taken three hundred persons more." If steam navigation could have been applied to no other purpose, than to move these floating-bridges over such streams as they cross, where other bridges are impracticable, he who introduced it well deserved to be ranked among the greatest benefactors of mankind,

Several boats have been built under the direction of Mr. Fulton, and according to his plans, for steam-boat companies formed in different parts of the United States; several of these were for the Ohio and Mississippi.

Let us for a moment consider what must be the consequences of introducing this species of navigation on these great rivers. Previously they were in a great measure innavigable except in the direction of their currents:

but now their streams may be ascended with less labour, and in less time than they were formerly descended. Never before was there so extraordinary a demonstration, that knowledge is power. The mind of an individual has contended with nature in her grandest form, and subdued what appeared to be her irresistible opposition.

If he could have created other rivers, like the Mississippi and its tributary streams,* to wind their thousands of miles through fertile valleys, he could not have done so great a good as he has done, by furnishing the means of navigating her waters against their currents. The time will come when a steam-boat will find its way from the Atlantic to our great inland seas, and from them into the Gulf of Mexico; and however distant that time may be, it will arrive long before the name of Fulton can be forgotten.

* It is said the shores of the Mississippi and of the rivers which flow into it, that are navigable for steam-boats, are equal to an extent of fifty thousand miles.

The last passage-boat which was constructed under Mr. Fulton's directions, and entirely according to drawings and plans furnished by him, is the boat which navigates the Sound from New-York to New-Haven: she is nearly four hundred tons burden, built with uncommon strength, and is fitted up with great convenience and elegance: she is the first steam-boat that had a round bottom like a ship. This form was adopted, because, for a great part of her route, she would be as much exposed as she could be on the ocean. It was, therefore, necessary to make her a perfect sea-boat. She passes daily, and at all times of the tide, the dangerous strait of Hell-Gate, where for the distance of nearly a mile, she often encounters a current running at the rate of at least six miles an hour. For some distance she has within a few yards of her on each side, rocks and whirlpools which rival Scylla and Charybdis even as they are poetically described. This passage, previously to its being navigated by this vessel, was always

supposed to be impassable except at certain stages of the tide; and many a shipwreck has been occasioned by a small mistake in the time. The boat passing through these whirlpools with rapidity, while the angry waters are foaming against her bows, and appear to raise themselves in obstinate resistance to her passage, is a proud triumph of human ingenuity. The owners, as the highest tribute they had in their power to offer to his genius, and as an evidence of the gratitude they owed him, called her *The Fulton*.

-About this period an attempt was made in congress to amend our extremely defective patent law, which is so little calculated to give that security to inventors, contemplated by the constitution, that it seems rather to involve them in endless litigation respecting the meaning and operation of its provisions, some of which are unintelligible, some impracticable, and some outrageously unjust. For example: how is an invention

to be distinguished from an improvement, particularly when it is declared, that any alteration in the form or proportions of a machine shall not give any right? how are the damages, given by the law, to be ascertained? and what are to be the proceedings for revoking a surreptitious patent? If by any failure of testimony, or any accident, a single verdict in any remote corner of the union, be rendered against a patentee, his patent, however meritorious it may be, becomes absolutely void; whereas a hundred verdicts in his favour, afford him no security.

It seems not a little derogatory to the state of the arts in this country, that a law, intended for their protection, should be so inartificially drawn. The fact is, that no patent of any value has been granted by the United States, which has not involved the patentee in perpetual legal contentions and ruinous expenditures. The obvious defects of this law induced the friends of the arts to make an attempt to prevail on the legislature to

amend it. Our learned associate, Doctor Mitchill, who was then a member of congress, and who is always foremost to encourage science, and to afford the protection of his great abilities to her votaries, introduced a new patent-law into the house of representatives. This induced those who felt an interest in the subject to address him; and among others Mr. Fulton communicated his ideas on the defects of the present system, and proposals for amending it. These thoughts of Mr. Fulton are preserved in the New-York Medical Repository.

The provision in the constitution, for the protection of mental property, is evidence of that regard for it which might be expected from an enlightened people: and the congress which passed the patent-law manifested its respect for the productions of intellect, by committing their guardianship to the highest officers of the government. The law requires that every patent shall issue under the sanction of the President, the Secretary

of State, and the Attorney-General. But though every patent has the signatures of these great personages, yet in fact they issue without their knowledge, at the pleasure of some person unknown to the constitution or laws, to whom, by signing blank patents, they commit all their authority; and it is as much a matter of course to issue a patent from the patent-office, as it is for the proper officer of a court to issue a writ upon payment of the customary fees. Applications for patents have become so numerous, that it would no doubt be impossible for the President, or any of the other chief officers of the government, to pay attention to them. We do not mean to say, that under the present system, a better practice than that which prevails could be adopted; much less do we mean to insinuate that the authority is transferred to improper hands; but the present practice is so entirely at variance as well with the theory of the constitution, as of the patent law, that some change in the system is certainly requisite.

If the necessary powers were delegated to a board of commissioners, who should be paid by exacting from the patentees sufficient fees, the spirit of the constitution might be fulfilled, and mental property be guarded with that circumspection, which is so necessary to protect a just title to it, from the attacks of ignorance, presumption, fraud, and avarice. If it had not been so easy for every miserable pretender to clothe himself with the presumptive title of inventor, Mr. Fulton would not have passed so many years in litigation; nor would his valuable life have been sacrificed by the exertions he was obliged to make to defend himself against those, who were desirous of enriching themselves with the spoils of his genius.

We must again recur to a former period of his life, to trace his connexion with a project, which is, perhaps, only inferior in interest to that of steam navigation. At least it must have this rank in the estima-

tion of Americans: we mean, opening in our country, communications by canals.

Mr. Fulton's Treatise on Canals made it known, that he had turned his thoughts to that subject, and probably induced Mr. Gallatin, then Secretary of the Treasury, to address a number of queries to Mr. Fulton, for information on which to ground the report made by the Treasury Department to Congress, on the subject of public roads and canals, in the spring of eighteen hundred and eight. In answer to these queries, Mr. Fulton made a communication to Mr. Gallatin, which is annexed to the report. It contains a great variety of information and calculations, of the most useful kind, upon the subjects proposed: we cannot refrain from extracting some passages of it, which show the extensive view which Mr. Fulton took of objects which were presented to his mind: that, so far from being limited by mere mechanical operations, he connects the great

improvements of art which he had in contemplation, with their ultimate effects on the happiness, prosperity, and policy of his country.

After having enumerated the economical advantages of improving internal communications, he says: "Secondly—on their effect in cementing the union, and extending the principles of a confederated republican government. Numerous have been the speculations on the duration of our union, and intrigues have been practised to sever the western from the eastern states. The opinion endeavoured to be inculcated was, that the inhabitants beyond the mountains were cut off from the market of the Atlantic states: that consequently they had a separate interest, and should use their resources to open a communication of their own: that remote from the seat of government, they could not enjoy their portion of advantages arising from the union, and that sooner or later they must separate, and govern for themselves."

“ Others, by drawing their examples from European governments, and the monarchies which have grown out of the feudal habits of nations of warriors, whose minds were bent to the absolute power of the few, and the servile obedience of the many, have conceived these states of too great an extent to continue united under a republican form of government; and that the time is not distant when they will divide into little kingdoms, retrograding from common sense to ignorance, adopting all the follies and barbarities which are every day practised in the kingdoms and petty states of Europe.

“ But those who have reasoned in this way, have not reflected that men are the creatures of habit, and that their habits, as well as their interests, may be so combined, as to make it impossible to separate them without falling back into a state of barbarism.

“ Although in ancient times, some specks of civilization have been effaced by hordes of

uncultivated men, yet it is remarkable, that since the invention of printing and general diffusion of knowledge, no nation has retrograded in science or improvements; nor is it reasonable to suppose that the Americans, who have as much, if not more information in general, than any other people, will ever abandon an advantage which they have once gained.

“England, which at one time was seven petty kingdoms, has by long habit been united into one. Scotland by succession became united to England, and is now bound to her by habit, by turnpike roads, canals, and reciprocal interests.

“In like manner all the counties of England, or departments of France, are bound to each other: and when the United States shall be bound together by canals, by cheap and easy access to a market in all directions, by a sense of mutual interests arising from mutual intercourse and mingled com-

merce, it will be no more possible to split them into independent and separate governments, each lining its frontiers with fortifications and troops, to shackle their own exports and imports to and from the neighbouring states, than it is now possible for the government of England to divide, and form again into seven kingdoms. But it is necessary to bind the states together by the people's interests, one of which is to enable every man to sell the produce of his labour at the best market, and purchase at the cheapest. This accords with the idea of Hume, "That the government of a wise people would be little more than a system of civil police: for the best interest of man is industry and a free exchange of the produce of his labour, for the things which he may require.

"On this humane principle, what stronger bonds of union can be invented, than those which enable each individual to transport the produce of his industry, twelve hundred

miles, for sixty cents the hundred weight? Here then is a certain method of securing the union of the states, and of rendering it as lasting as the continent we inhabit.

“ It is now eleven years that I have had this plan in contemplation for the good of our country. At the conclusion of my work on small canals, there is a letter to Thomas Mifflin, then Governor of the State of Pennsylvania, on a system of canals for America. In it I contemplated the time when ‘ canals should pass through every vale, winding round each hill, and bind the whole country together in the bonds of social intercourse: and I am now happy to find, through the good management of a wise administration, a period has arrived when an overflowing treasury exhibits abundant resources, and points the mind to works of such immense importance.’ ”

We have already said, that the earliest notice we have met with of the utility and

practicability of opening a communication between the great lakes and the Hudson, is in a letter addressed by Mr. Fulton in eighteen hundred and seven, to the government, in answer to an application made to him through General Dearborn, respecting a canal from Lake Pontchartrain to the Mississippi. But a project which promises such incalculable advantages to the state of New-York, and, indeed it may be said, to the world, soon attracted the attention of the public; and in the spring of eighteen hundred and ten, the legislature of New-York appointed commissioners to explore the route of an inland navigation from Hudson River to Lake Ontario and Lake Erie. This commission reported in eighteen hundred and eleven. The same session Mr. Fulton was by an act of the legislature appointed one of the commissioners.

In eighteen hundred and twelve a second report was made. In their report of eighteen hundred and eleven, the commissioners had suggested the possibility of bringing the

waters of Lake Erie to a reservoir near the Hudson, a distance of three hundred miles, in a canal on an inclined plane, having a descent of six inches to a mile, by making mounds and aqueducts over the intervening valleys: as the descent of six inches to a mile would place the reservoir at a great elevation from the level of the river, the commissioners proposed that it should be brought down from thence by locks, so that the extreme of the inclined plane at the lake, would be one hundred and fifty feet higher than the end at the river,

Though the commissioners, in their second report, appear to have abandoned the idea of an inclined plane for the whole extent, they yet supposed that the canal might be conducted as far as the Seneca outlet, as they had proposed in their first report. It is probable, that Mr. Fulton, though this proposal has been sanctioned by an English engineer of great eminence, may have found it difficult to conceive how water could be con-

lined within the banks of a canal, which should have so considerable an elevation at the one end above the locks, by which it would be stopped at the other. He might also have supposed that there would have been great difficulty in raising a mound of earth one hundred and thirty feet high, as a bed for the canal over the Cayuga outlet and its valley for a mile in extent.

A difference between Mr. Fulton and his colleagues on these points, possibly may have been the reason why the report of eighteen hundred and twelve was presented to the legislature without the signature of Mr. Fulton, though he had been appointed one of the commissioners the preceding year. But Mr. Fulton entered into this sublime enterprise, as he calls it, with all the zeal and ardour natural to his character.

In February, eighteen hundred and fourteen, he addressed a letter to Gouverneur Morris, Esq. President of the Board of Com-

missioners, in which he shows what would be the advantages of the proposed canal, and exhibits very interesting and curious calculations of the comparative expense of transportation upon land, upon rivers, and upon canals.

The same year Mr. Fulton, with the other commissioners, made another report to the legislature: this is the last service he rendered this magnificent project.

At the ensuing session the legislature united with the community at large, in public testimonials of their regret for the loss of a citizen whose talents would have been so valuable, not only in the execution of this great national work, but in every thing which is connected with the progress of the arts in our country.

The commencement of hostilities between the United States and Great Britain, gave

new activity to Mr. Fulton's thoughts on submarine warfare.

The power of his machines, the officers of the British navy had learned from what he had done in England: and it is certain that they approached our shores with no little caution. This was manifested by their solicitude to know where Fulton was, and what he was about, whenever they had an opportunity of making inquiries; by the respectful distance at which they generally kept their ships from our shores, and the precautions they took whenever they approached them. On these accounts there was no opportunity of doing any thing with torpedoes during the war.

Several partial and ineffectual attempts upon the enemy's vessels were made by different enterprising individuals. It is very possible that the dread of what might be done by Mr. Fulton, who they knew was a resident of this city, and had here been trying expe-

periments with submarine explosions, determined the British to direct their hostilities to other parts of the United States rather than to this port.

But Mr. Fulton's plan for submarine warfare met with no countenance from the government. He had not been able to inspire the executive officers with any confidence in them.

The unfavourable opinion of some of our gallant naval commanders, was calculated to have great influence against any reliance on Mr. Fulton's machines. No system was arranged for preparing or employing them: attempts which were made, were conducted by persons who were entirely inexperienced in the use of torpedoes, and had none of the qualifications for such an enterprise, but courage. Under such circumstances, nothing but failures were to be expected.

Had Mr. Fulton's proposition to organize a marine corps, to be instructed and practised in the use of torpedoes, been adopted, the war might have afforded an opportunity of giving them such a trial as would have been decisive as to their utility.

But Mr. Fulton's thoughts upon submarine war took another direction. Having ascertained by the experiments he had made with his cable-cutter, that powder might be discharged from a piece of ordnance under water with effect, he conceived the idea of forming submarine batteries. With this view he instituted a number of experiments, to try the practicability and effect of discharging cannon loaded with ball at different depths under water.

He made a number of calculations on this subject: his desire to ascertain what resistance a ball of given dimensions propelled

with a certain velocity, would meet with in passing through a body of water at a certain depth. The basis he took for these calculations, and the calculations themselves, mark both his ingenuity and his science.

He assumed, that a body passing through water, would meet with a resistance equal to the force of a column of water of the same diameter as the body moving with the given velocity. He then ascertained what head or height of water would be required to discharge a stream of water, from an orifice at the foot of a perpendicular tube, with the same velocity with which the body was supposed to be propelled. He then, by the well-known rules of hydraulics, found what force or power the ascertained head of water would give, and thence formed his estimates as to the resistance which a body projected in water would meet with.

In this instance, as in others, he is not satisfied with arriving at the information neces-

sary for his particular purpose; but he establishes, from his calculations, a rule which may, by a very brief and simple arithmetical process, afford all the information and accuracy generally necessary for practical purposes.

His first experiment was with a four-pounder, having the breech, and as much of the gun as is usually within the sides of a vessel, in a water-tight box, and the muzzle stopped with a stopper: the box and gun were then submerged three feet in the Hudson: the gun was fired by dropping a live coal through a tin tube which penetrated the box immediately above the vent of the gun, and rose above the surface of the water: the ball was found to have struck the sand at the bottom of the river, at the distance of forty-one feet from the muzzle. The gun was uninjured. This experiment satisfied him that guns might be placed in a ship, below her water-line with their breech on board, and their muzzles in the water, without

any more danger of their bursting, than there is when they are fired in the air. This gave him the idea of arming ships with guns to be fired in this way.

He proposed that the muzzle of the gun made for the purpose, should recoil through a stuffing box, and be followed by a valve which would exclude the water when the gun was not protruded. An elegant model on this construction is now in the possession of his family.

. He next tried the same piece with a pound and a half of powder, and fired it by means of one of his water-tight locks when it was entirely in water, three feet below the surface: the ball penetrated eleven and a half inches into a target of pine logs, which had been prepared for the purpose, and placed beneath the water at the distance of twelve feet from the piece.

His next experiment was with a Columbiad carrying a hundred pound ball, fired at the target as in the last instance: all that we know is, that the ball tore the target to pieces, and that the cannon was uninjured.

We have not information that will enable us to give any further details of this experiment; but we know that Mr. Fulton was entirely satisfied with the result. He proposed to use cannon in this way by suspending them, two for instance, from the bows of the vessel. A single shot; as he demonstrates, from a piece of large caliber, which should break into the side of a ship, at any considerable depth beneath the water-line, must be fatal to her. And though the range of shot fired through water, may be but a few feet, yet conflicting vessels, whenever they engage yard-arm and yard-arm, with accounts of which our naval heroes have of late made us so familiar, must be so

near as to give effect to a submarine discharge.

Mr. Fulton did not propose that these guns should be always in the water; but that they should be suspended so as to be raised when the vessel was not in action.

These plans, for the submarine use of cannon, were submitted to one of our most distinguished naval commanders, who gave them his decided approbation.

He expressed a strong opinion that such an attack would be fatal to any vessel exposed to it, and that it would be extremely difficult for an enemy to evade an attempt, made with sufficient resolution, to destroy her by these means.

In eighteen hundred and thirteen, Mr. Fulton took out a patent "for several improvements in the art of maritime warfare, and

means of injuring and destroying ships and vessels of war, by igniting gunpowder under water, or by igniting gunpowder below a line horizontal to the surface of the water; or so igniting gunpowder, that the explosion which causes injury to the vessel attacked, shall be under water."

This description, in the words of his patent, includes another idea he had; which was to plant batteries of submarine guns near the channels through which hostile vessels must pass to attack our sea-ports.

He communicated to Mr. Jefferson an account of his experiments on submarine firing, with drawings of his various plans. Mr. Jefferson expressed himself much pleased with this novel mode of maritime warfare, and assured Mr. Fulton that he would recommend it to the attention of government.

It is curious to observe how Mr. Fulton's projects grew one out of another.

The submarine guns gave rise to the steam man of war.

It having been suggested, by the distinguished naval officer before alluded to, that in approaching an enemy so near as was necessary to give effect to submarine cannon, the vessel, if she was rigged in the ordinary way, would be liable to be entangled with her adversary ; to meet this objection, Mr. Fulton proposed to move the vessel by steam. His reflections on this project, and what he saw of the performance of so large a vessel as the Fulton, her speed, and the facility with which she was managed, led him to conceive, that a vessel of war might be constructed, in which, to all the advantages possessed by those now in use, might be added the very important ones which she would derive from being propelled by steam, as well as by the winds.

But before we pursue this subject, we will notice an occurrence that seems to show the practical knowledge Mr. Fulton had acquired in mechanics, and to mark the quickness of his apprehension.

We must all remember how long, and how successfully, Redheffer had deluded the Pennsylvanians by his perpetual motion.

Many men of ingenuity, learning, and science had seen the machine: some had written on the subject; not a few of these were his zealous advocates; and others, though they were afraid to admit that he had made a discovery which violated what were believed to be the established laws of nature, appeared also afraid to deny what the incessant motion of his wheels and weights seemed to prove. These contrived ingenious theories, which were hardly less wonderful than the perpetual motion itself. They supposed that Redheffer had discovered a means of developing gradually some hidden power, which

though it could not give motion to his machine for ever, would keep it going for some period, which they did not pretend to determine.

One of these perpetual motions commenced its career in this city in eighteen hundred and thirteen. Mr. Fulton was a perfect unbeliever in Redheffer's discovery, and although hundreds were daily paying their dollar to see the wonder, Mr. Fulton could not be prevailed upon for some time to follow the crowd. After a few days, however, he was induced by some of his friends to visit the machine. It was in an isolated house in the suburbs of the city.

In a very short time after Mr. Fulton had entered the room in which it was exhibited, he exclaimed, "why, this is a crank motion." His ear enabled him to distinguish that the machine was moved by a crank, which always gives an unequal power, and therefore an unequal velocity in the course of each

revolution: and a nice and practised ear may perceive that the sound is not uniform. If the machine had been kept in motion by what was its ostensible moving power, it must have had an equable rotary motion, and the sound would have been always the same.

After some little conversation with the showman, Mr. Fulton did not hesitate to declare, that the machine was an imposition, and to tell the gentleman that he was an impostor.

Notwithstanding the anger and bluster which these charges excited, he assured the company that the thing was a cheat, and that if they would support him in the attempt, he would detect it at the risk of paying any penalty if he failed.

Having obtained the assent of all who were present, he began by knocking away

some very thin little pieces of lath, which appeared to be no part of the machinery, but to go from the frame of the machine to the wall of the room, merely to keep the corner posts of the machine steady.

It was found that a catgut string was led through one of these laths and the frame of the machine, to the head of the upright shaft of a principal wheel: that the catgut was conducted through the wall, and along the floors of the second story to a back cock-loft, at a distance of a number of yards from the room which contained the machine, and there was found the moving power. This was a poor old wretch with an immense beard, and all the appearance of having suffered a long imprisonment; who, when they broke in upon him, was unconscious of what had happened below, and who, while he was seated on a stool, gnawing a crust, was with one hand turning a crank,

The proprietor of the perpetual motion soon disappeared. The mob demolished his machine, the destruction of which, immediately put a stop to that which had been, for so long a time, and to so much profit, exhibited in Philadelphia.

But to return to more important subjects.

At the commencement of the year eighteen hundred and fourteen, a number of the citizens of New-York, alarmed at the exposed situation of our harbour, had assembled with a view to consider whether some measures might not be taken to aid the government in its protection. This assembly had, in fact, been invited by some knowledge of Mr. Fulton's plans for submarine attack, and of his contemplating other means of defence.

They deputed a number of gentlemen to act for them, and these were called the coast and harbour defence committee.

Mr. Fulton exhibited to this committee the model and plans for a vessel of war to be propelled by steam, capable of carrying a strong battery, with furnaces for red-hot shot, and which, he represented, would move at the rate of four miles an hour.

The confidence of the committee in this design, was confirmed by the opinions of many of our most distinguished naval commanders, which he had obtained in writing, and exhibited to the committee.

In this document, which is signed by Commodore Decatur, Captain Jones, Captain Evans, Captain Biddle, Commodore Perry, Captain Warrington, and Captain Lewis, these gallant and experienced seamen enumerate the following advantages that such a vessel would possess: In a calm or light breeze she could make choice of position or distance. If she could move at the rate of four miles an hour, she could, in our har-

bours, bays, and rivers, be rendered more formidable than any kind of engine hitherto invented, and, in such case, she would be equal to the destruction of one or more seventy-fours, or of compelling them to depart from our waters. They, therefore, gave it as their decided opinion, that it was among the best interests of the United States, to carry Mr. Fulton's plan into immediate execution.

It was contemplated that this vessel, besides carrying her proposed armament on deck, should also be furnished with submarine guns.

The committee, without delay, addressed a memorial to Congress, recommending the invention of Mr. Fulton, and praying that measures might be adopted for executing his plan. With this memorial the committee addressed a letter to the Secretary of the Navy, soliciting in a very earnest manner his patronage and influence with the govern-

ment. Without the skill and talents, they say, of Mr. Fulton, the machine cannot be constructed.

It was apprehended that there would be great difficulty about funds.

On the one hand, there was a disinclination to make the project public, by inducing a discussion on the subject in Congress; and, on the other, it was doubtful whether the executive was authorized to make the necessary appropriations without a law for the purpose. To obviate these difficulties, the committee offered, in behalf of the association which they represented, to construct the vessel at their expense and risk, if assurances were given that the government, which alone could give employment to her, would receive and pay for her after she was built, and her utility demonstrated. It was estimated that she would cost about three hundred and twenty thousand dollars,

nearly the sum requisite for a frigate of the first class.

This activity of private citizens for their own protection; this voluntary offer to risk their funds, first, upon the success of the project, and then upon a bare assurance of the executive of the government: and this intimate intercourse between the rulers and the people, present a view of a state of society, of which, it is believed, there are few examples.

The project was zealously embraced by the executive; and the national legislature, in March, eighteen hundred and fourteen, passed a law, authorizing the President of the United States to cause to be built, equipped, and employed, one or more floating batteries for the defence of the waters of the United States.

The building of the vessel was committed, by the coast and harbour defence association,

to a sub-committee of five gentlemen: they were, General Dearborn, who then commanded in this district, Colonel Henry Rutgers, Oliver Wolcot, Samuel L. Mitchill, and Thomas Morris, Esquires, who were recognised by the government as their agents for this purpose.

Mr. Fulton, whose soul indeed animated the whole enterprise, was appointed the engineer.

On the twentieth of June, eighteen hundred and fourteen, the keel of this novel and mighty engine was laid; and in little more than four months, that is, on the twenty-ninth of October, she was launched from the yard of Adam and Noah Brown, her able and active architects.

The scene exhibited on that occasion was magnificent. It happened on one of our bright autumnal days. Multitudes of spectators crowded the surrounding shores, and

were seen upon the hills which limited the beautiful prospect. The river and bay were filled with vessels of war, dressed in all their variety of colours, in compliment to the occasion. In the midst of these was the enormous floating mass, whose bulk, and unwieldy form, seemed to render her as unfit for motion, as the land batteries which were saluting her. Through the fleet of vessels which occupied this part of the harbour, were seen gliding in every direction, several of our large steam-boats of the burden of three and four hundred tons. These, with bands of music, and crowds of gay and joyous company, were winding through passages left by the anchored vessels, as if they were moved by enchantment. The heart could not have been human that did not share in the general enthusiasm expressed by the loud shouts of the multitude. He could not have been a worthy citizen, who did not then say to himself, with pride and exultation, this is my country! and when he looked on the man whose single

genius had created the most interesting objects of the scene, this is my countryman!

By May, eighteen hundred and fifteen, her engine was put on board, and she was so far completed as to afford an opportunity of trying her machinery.

But, unhappily before this period, the mind that had conceived and combined it was gone. It was the pleasure of the Almighty, that Fulton should live to serve mankind, and be taken to a better world for his reward.

On the fourth of July, in the same year, the steam frigate made a passage to the ocean and back, and went the distance, which, going and returning, is fifty-three miles, in eight hours and twenty minutes, by the mere force of her engine. These trials suggested the correction of some errors, and the supplying of some defects in the machinery. In September, she made another passage to the sea, and having at this time the weight of her

whole armament on board, she went at an average of five and a half miles an hour with, and against, the tide. When stemming the tide, which ran at the rate of three miles an hour, she advanced at the rate of two and a half miles an hour.

This performance was not more than equal to Mr. Fulton's expectations; but it exceeded what he had promised the government, which was, that she should be propelled by steam, at the rate of from three to four miles an hour.

The truth is, there are yet the most obvious and important defects in the machinery of this vessel; and if these were corrected, it is highly probable, that her speed would be but little inferior to that of any steam vessel which has been built.

The substance of the following description of the *Fulton the First*, the honoured name this vessel bears, is extracted from the

report of the gentlemen who were the commissioners for building her.

She is a structure resting on two boats and keels, separated from end to end by a channel fifteen feet wide, and sixty-six feet long; one boat contains the caldrons of copper to prepare her steam. The cylinder of iron, its piston, levers, and wheels, occupy part of the other. The water-wheel revolves in the space between them. The main or gun-deck supports the armament, and is protected by a parapet, four feet ten inches thick, of solid timber, pierced by embrasures. Through thirty port-holes, as many thirty-two pounders are intended to fire red-hot shot, which can be heated with great safety and convenience. Her upper or spar-deck, upon which several thousand men might parade, is encompassed with a bulwark, which affords safe quarters: she is rigged with two stout masts, each of which supports a large latteen yard and sails: she has two bowsprits and jibs, and four rudders, one at each

extremity of each boat ; so that she can be steered with either end foremost : her machinery is calculated for the addition of an engine, which will discharge an immense column of water, which it is intended to throw upon the decks, and through the port-holes of an enemy, and thereby deluge her armament and ammunition. If, in addition to all this, we suppose her to be furnished, according to Mr. Fulton's intention, with hundred pound Columbiads, two suspended from each bow, so as to discharge a ball of that size into an enemy's ship at ten or twelve feet below her water-line ; it must be allowed, that she has the appearance at least, of being the most formidable engine for warfare, that human ingenuity has contrived.

The English were not uninformed as to these preparations which were making for them, nor inattentive to their progress. It is certain, that the steam frigate lost none of her terrors in the reports, or imaginations

of the enemy. In the treatise on steam vessels, published in Scotland, which we have before noticed, the author of which assures us, that he has taken great care to procure full and accurate information, we have a description of a steam frigate said to have been launched in New-York, in the following words: "length on deck three hundred feet; breadth two hundred feet; thickness of her sides thirteen feet, of alternate oak plank, and cork-wood; carries forty-four guns, four of which are hundred pounders; quarter-deck and forecastle guns, forty-four pounders; and further, to annoy an enemy attempting to board, can discharge one hundred gallons of boiling water in a minute, and by mechanism, brandishes three hundred cutlasses with the utmost regularity over her gunwales; works also an equal number of heavy iron pikes of great length, darting them from her sides, with prodigious force, and withdrawing them every quarter of a minute!"

The committee that superintended the building of the *Fulton the First*, who had, from the various experiments they made, the best opportunity of judging of her usefulness, speak in their last report to the government with the highest confidence in her powers. They congratulate the navy department and the nation on the event of this noble project, honourable alike, as they truly say, to its author and its patrons, by which the city of New-York has the power to make itself invulnerable, and every bay, and harbour, in the nation may be protected. The committee strongly recommend the vessel to the care of the government. Without due attention her machinery will very soon become useless. But as they very justly remark, it is not enough to preserve her. To derive from such a machine, in time of war, all the advantages it is capable of affording, we should be practised in the use of it in time of peace. The expense of completely arming, equipping, and employing her suffi-

ciently to afford the necessary practice, would not exceed that of a frigate, and it certainly would be beneficially bestowed. But to many minds, it seems waste to expend money on any thing so long as it has the character of an experiment.

We now come to mention the last work in which the active and ingenious mind of Mr. Fulton was engaged. This was a project for the modification of his submarine boat. He had contrived a vessel which was to have a capacity by means of an air-chamber, like that which was in his Nautilus, to be kept at a greater or less depth in the water, but so that her deck should not be submerged. That chamber communicated with the water, and was shaped like a diving-bell; but it could at pleasure, by an air-pump, be exhausted of air, and then it would, of course, fill with water, or any requisite quantity of air could be forced into it, so as to expel the water from it entirely. The sides of the vessel were to be of the ordinary thickness;

but her deck was to be stout and plated with iron, so as to render it ball-proof; which would not require so much strength as might be at first imagined; because, as no shot could strike it from a vessel but at a very great angle, the ball would recouché on a slight resistance from a hard substance. She was to be of a size capable of sheltering a hundred men under her deck, and was to be moved by a wheel placed in another air-chamber near the stern; so that when the vessel was to be propelled, only a part of the under paddles should be in water; at least the upper half of the wheel, or more, moving in air. The wheel was to be turned by a crank attached to a shaft, that should penetrate the stern to the air-chamber through a stuffing box, and run along the middle of the boat until it approached her bows. Through this shaft, rungs were to be passed, of which the crew were to take hold as they were seated on each side of it on benches. By merely pushing the shaft backward and forward, the water-wheel would be turned,

and the boat be propelled with a velocity equal to the force of a hundred men. By means of the air-chamber, she was to be kept, when not in hostile action, upon the surface, as common boats are. But when in reach of an enemy, she was to sink, so that nothing but her deck would be exposed to his view or to his fire. Her motion when in this situation would be perfectly silent, and therefore, he called this contrivance a mute. His design was, that she should approach an enemy, which he supposed she might do in fogs or in the night, without being heard or discovered, and do execution by means of his torpedoes or submarine guns.

He presented a model of this vessel to the government, by which it was approved; and under the authority of the executive, he commenced building one in this port; but before the hull was entirely finished, his country had to lament his death, and the mechanics he had employed were incapable of proceeding without him.

During the whole time that Mr. Fulton had thus been devoting his talents to the service of his country, he had been harassed by lawsuits and controversies with those who were violating his patent rights, or intruding upon his exclusive grants. The state of New-Jersey had been prevailed upon to enlist herself on the side of individuals, who were desirous of destroying the grant made to Messrs. Livingston and Fulton by the state of New-York, that they might share in their profits. Though New-Jersey had set the example to New-York of making such a grant, by a law which they had passed in favour of John Fitch, almost in the very words of the law which was subsequently passed by New-York, in favour of Mr. Livingston; yet the legislature of the state of New-Jersey was induced to consider the act of New-York as derogatory to her rights, and was prevailed upon to pass laws, which, though they were in effect an exclusive grant to those by whose means they had been procured, the state was made to believe, were a

necessary retaliation to vindicate her rights against the usurpation of New-York, in excluding all steam-boats, but those she had privileged, from that part of the interjacent waters which she claims as within her jurisdiction. The last law, of the state of New-Jersey of this description, was passed in November, eighteen hundred and thirteen. It granted an exclusive right to the persons therein named, to navigate the waters of New-Jersey by steam, and subjected to forfeiture any steam-boat that should contravene this exclusive grant. But this law, as it could not open to their boats the approach to the city of New-York, was but of little benefit to the grantees. Its only operation was to stop a boat owned in New-York, which had been several years running to New-Brunswick, under a license from Messrs. Livingston and Fulton.

A bold attempt was therefore made to induce the legislature of the state of New-York, to repeal the laws which they had

passed for the protection of their exclusive grant to Livingston and Fulton; or it may with more propriety be said, that these laws of New-York were passed to secure an honest fulfilment on the part of the state, of a solemn contract which it had made with these gentlemen, that they should for a certain time enjoy an exclusive privilege, on the faith of which they had pledged their fortunes.

The petitioner for this repeal founded his claim to this concession: First, on his having purchased the right of John Fitch to exclusive grants, which had been made to him by New-Jersey and New-York, in seventeen hundred and eighty-six, and seventeen hundred and eighty-seven, for fourteen years, which time had expired thirteen years before this application was made, without Fitch's ever having even attempted to move a steam-boat on the waters of the state of New-York, or New-Jersey, or having succeeded, as we have seen, in establishing a

steam-boat any where. It appeared afterwards, that the petitioner had purchased this exclusive right of a person, who said he was a remote relation of Fitch, and his legal representative, for ten dollars.

Secondly, it was represented that one Daniel Dod was entitled to the favour of the legislature, on account of his having invented a method of uniting, by what he called a parallel link, parts of the machinery differently from that adopted by Mr. Fulton. Upon these merits the petitioners had obtained their exclusive grant from New-Jersey; and upon these grounds, while that exclusive grant was existing in their favour, they came to ask a repeal of the laws of the state of New-York, which had been enacted to reward Messrs. Livingston and Fulton; who after years of experiment and labour, and the expenditure of a fortune, had been the first to bring steam-boats into successful operation.

One cannot but be surprised at the temerity of such an application; but success in New-Jersey had convinced the petitioners, that in every numerous assembly there were men, whose envy and ignorance would give a chance of success to any proposition to take from genius its credit or reward.

This petition was presented to the house of assembly, and referred to a committee. On the eighteenth of March, eighteen hundred and fourteen, the committee made a report; and in it stated what they represented to be facts.

They stated, that Dod, without having seen Fulton's patent, (but they do not say, without having seen his boats,) constructed an engine, and invented improvements, which are material and important.

That the petitioner had built a boat with a steam engine, on the plan of Watt and Bol-

ton, improved by Dod, adapted to wheels turned by cranks.

That the boats built by Livingston and Fulton, were in substance the invention of Fitch.

They further reported, that the recitals in the act of seventeen hundred and ninety-eight, granting to Robert R. Livingston an exclusive right, were not true; he not having then been in possession of a mode of applying a steam engine to propel a boat on new and advantageous principles as he had represented; and Fitch having previously constructed a steam-boat, and obtained a patent for it.

It cannot but be observed with what partiality the committee contrast the merits of Dod and Fitch, with those of Livingston and Fulton. Mr. Dod, for his parallel link, and cranks, both of which are nearly as old as the first application of engines to produce a rotary motion, is held up as a most meritorious

inventor; and Mr. Fitch, for his boat, which he could not make sufficiently perfect to answer any useful purpose, is preferred to Mr. Livingston and Mr. Fulton, who, it cannot be disputed, were the first to give the world a benefit from the application of steam to navigation.

But it is evident that the committee were perfectly ignorant of the subject on which they affected to give the house information, or they never could have given Dod credit for material and important improvements.

That part of the report, stating that the recitals of the act of seventeen hundred and ninety-seven are untrue, is much more unpardonable than the mistakes of ignorance. They say it is untrue that Mr. Livingston was then, as these acts recite he had represented, in the possession of a mode of applying the steam engine to boats, on new and advantageous principles; because Fitch had previously obtained a patent. Does it

thence follow that Mr. Livingston might not have had a mode of applying the engines to boats, different from Fitch's? and might not this mode have been new and advantageous?

How shocking is this imputation, so obviously unmerited, on the veracity of a man who lived as respected as beloved! to whom as a patriot, statesman, philanthropist, and philosopher, society owed the highest obligations; whom she had intrusted with her dearest interests, and on whom she had conferred the highest honours. The hall, in which this reproach was uttered, had but recently been hung with emblems, to show that a people mourned his death. Every generous feeling must revolt at such language, at such a time, applied to such a man.

But on this point the committee had no sort of testimony before them: They did not ask for testimony: They were content with the representations of the petitioner; and certainly there was not a member of the

committee who knew, or pretended to know, what Mr. Livingston's method was; or if they did, we may judge how capable they were of comparing it with Fitch's, or any other plan, when we see them giving so much credit to Daniel Dod as an inventor, for his parallel links and cranks. The fact is, that Mr. Livingston's plan differed as much from Fitch's, as Mr. Fulton's differed from Livingston's.

The committee concluded their report, with proposing a bill containing such provisions as might in their opinion be passed consistently with the faith, honour, and justice of the state.

The proposed bill declared that nothing in the acts passed in favour of Livingston and Fulton, should be construed so as to affect the right which any person might have to use the invention of the steam-boat, or any improvement thereon, which had been, or might thereafter be, patented under the

laws of the United States ; provided, that in such use, they did not interfere with any invention, or improvement, lawfully secured by the prior acts, or any of them.

It is to be observed that this proviso is a mere nullity; none of the acts referred to by it, did secure, or even pretend to secure, any invention; so that the law proposed by the committee was in effect an entire repeal of the exclusive grants to Livingston and Fulton; and Daniel Dod, with his patented application of the engine to cranks, or any other patentee equally meritorious, might, if the law had passed, have freely navigated the waters of this state by steam.

When Livingston and Fulton had spent an immense sum of money in the establishment of their magnificent boats: when they had not realized a cent from their enterprise; but on the contrary were largely in debt on that account, this law was recommended to the legislature as one that might be passed

consistently with good faith, honour, and justice!

Upon this report's being made to the house, it was prevailed upon to be less precipitate than the committee had been. It gave time, which the committee would not do, for Mr. Fulton to be sent for from New-York. The senate and assembly in joint session examined witnesses, and heard him, and the petitioner, by counsel. The result was, that the legislature refused to repeal the prior law, or to pass any act on the subject.

It was upon this occasion that his friend Mr. Emmet, who appeared as his counsel at the bar of the house, at the conclusion of his speech made that address to Fulton, which has been so much spoke of, and which was at once such an evidence of warmth of heart, rectitude of principle, and of superior abilities. We do not pretend to give it in the very words he made use of, nor can it now have the effect, which his oratory, and

circumstances, produced when it was delivered; but so far as it is in our power, we will endeavour to preserve it, as a just tribute to our departed friend, and as a memorial of the abilities of his advocate.

Mr. Emmet, having said that he had concluded the observations which he proposed to make, as well against the petition, as the report of the committee; and that he submitted their force with respectful confidence to the deliberation of the legislature, turned towards Mr. Fulton, and addressed him as follows:—"I know and feel, and I rejoice in the conviction, that, for the present at least, *your* interests, my friend, are perfectly secure; but do not, therefore, flatter yourself that you will be involved in no future difficulties, on the same account. Those whom I have just addressed, will certainly decide with enlightened liberality and a scrupulous regard to public faith; but their power and authority will pass away. Your present antagonist, I also hope, will become convinced by this

discussion of the impropriety of his application, and refrain from repeating it ; but interest and avarice will still raise up against you many enemies. You rely too implicitly on the strength of your rights, and the sanctity of the obligations on which they are founded.—You expect too much from your well-earned reputation, and the acknowledged utility to mankind of your life and labours.—You permit your mind to be engrossed with vast and noble plans for the public good.—You are inconsiderately sinking your present income in the extension of public accommodation by steam-boats.—You are gratuitously giving your time and talents to the construction of that great national object, your stupendous invention for maritime defence ; which in itself is calculated to effect a revolution in naval warfare.—You are profusely lavishing what the intense and unremitted study of years has acquired for you, in investigations and experiments tending to the same purpose.—Your knowledge and your fortune are freely bestowed upon every

thing that can contribute to the advancement of science, or of the elegant and useful arts. I admire and applaud you for your readiness to devote to the service of the public, the opulence you derive from its grateful remuneration. Let me remind you, however, that you have other and closer ties.—I know the pain I am about to give, and I see the tears I make you shed—but by that love I speak—by that love, which, like the light of Heaven, is refracted in rays of different strength upon your wife and children; which when collected and combined, forms the sunshine of your soul;—by that love I do adjure you, provide in time for those dearest objects of your care.—Think not I would instil into your generous mind a mean or sordid notion;—but now that wealth is passing through your hands, let me entreat you, hoard it while you have it. Artful speculators will assuredly arise, with patriotism on their tongues, and selfishness in their hearts, who may mislead some future legislature by false and crafty declamations against

the prodigality of their predecessors—who, calumniating or concealing your merits, will talk loudly of your monopoly—who will represent it as a grievous burden on the community, and not a compensation for signal benefits—who will exaggerate your fortune, and propose, in the language of Marat to the French Convention, “ Let the *scythe* of *equality* move over the republic.” In a moment of delusion, (unless some department of our government shall constitutionally interpose an adamant barrier against national perfidy and injustice,) such men may give your property to the winds, and your person to your creditors. Then, indeed, those who know your worth and services, will speak of your downfall, as of that portentous omen, which marked a people’s degradation, and the successful crime of an intruder :

A falcon, towering in his pride of place,
Was by a mousing owl hawked at and killed.

Yes, my friend!—my heart bleeds while I utter it; but I have fearful forebodings, that

you may hereafter find in public faith a broken staff for your support, and receive from public gratitude, a broken heart for your reward."

In January, eighteen hundred and fifteen, Mr. John R. Livingston, who owned the steam-boat which plied between New-York and New-Jersey, but which was stopped by the operation of the Jersey laws, petitioned the legislature of that state for their repeal. After hearing witnesses and counsel for several days, the laws were rescinded. It was upon this occasion that Mr. Fulton was examined as a witness, as we have before stated. The weather, while he was at Trenton, where he was much exposed in attending the hall of the legislature, was uncommonly cold. When he was crossing the Hudson to return to his house and family, the river was very full of ice, which occasioned his being several hours on the water in a very severe day. Mr. Fulton had not a constitution to encoun-

ter such exposure, and upon his return he found himself much indisposed from the effects of it. He had at that time great anxiety about the steam-frigate, and, after confining himself for a few days, when he was convalescent, he went to give his superintendence to the artificers employed about her: he forgot his debilitated state of health in the interest he took in what was doing on the frigate, and was a long time, in a bad day, exposed to the weather on her decks. He soon found the effects of this imprudence. His indisposition returned upon him with such violence as to confine him to his bed: His disorder increased, and on the twenty-fourth day of February, eighteen hundred and fifteen, terminated his valuable life.

It was not known that Mr. Fulton's illness was dangerous, till a very short time before his death, which was unexpected by his friends, and still more so by the community. As soon as it was known, all means were taken to testify, publicly, the universal regret

at his loss, and respect for his memory. The newspapers that announced the event, had those marks of mourning, which are usual in our country when they notice the death of public characters. The corporation of our city, the different literary institutions, and other societies, assembled and passed resolutions expressing their estimation of his worth, and regret at his loss. They also determined to attend his funeral, and that the members should wear badges of mourning for a certain time.

As soon as the legislature, which was then in session at Albany, heard of the death of Mr. Fulton, they expressed their participation in the general sentiment, by resolving that the members of both houses should wear mourning for some weeks.

This is the only instance, we believe, of such public testimonials of regret, esteem, and respect, being offered on the death of a private citizen, who never held any office,

and was only distinguished by his virtues, his genius, and the employment of his talents.

He was buried on the twenty-fifth day of February, eighteen hundred and fifteen. His corpse was attended from his last residence, (No. 4 State-street,) by all the officers of the national and state governments, then in the city, by the magistracy, the common council, a number of societies, and a greater number of citizens than have been collected on any similar occasion. From the time the procession began to move, till it arrived at Trinity Church, minute guns were fired from the steam-frigate and the West Battery. His body, in a leaden coffin, covered with plain mahogany, on which is a metal plate engraved with his name and age, is deposited in a vault belonging to the Livingston family.

In the year eighteen hundred and six, Mr. Fulton married Miss Harriet Livingston, a daughter of Walter Livingston, Esquire, a relative of his enterprising associate Chan-

cellor Livingston. He has left four charming infant children: one son, Robert Barlow Fulton, and three daughters.

We have all witnessed with what zeal Mr. Fulton bestowed his time, his talents, and his purse, for the promotion of the useful and the fine arts. One of the last acts of his life manifested this disposition. By his will, which was made but a few days before his death, he devised that, in certain events, his pictures, and one half of his property not otherwise disposed of, should go to an academy of fine arts, when such an academy should be established, at the place which may be the seat of the national government.

In eighteen hundred and sixteen, a principal street, which will be the great thoroughfare across the city, from the Fulton-Boat Ferry on the one river, to a similar ferry on the other, was opened. This the corporation of our city, always the patrons of science

and the friends of its votaries, have called Fulton-street.

Mr. Fulton, in contributing his proportion to the establishment of the magnificent boats on the Hudson, each of which cost from forty to sixty thousand, and the last one • which has been built, upwards of a hundred thousand dollars, expended immense sums of money. The experiments he was always making, required very large disbursements, and the lawsuits in which he was incessantly engaged, from the moment his boats were seen in successful operation, were very expensive. From his patents he never derived the advantage of a single cent; but, on the contrary, in consequence of the misconduct or mistake of some of the agents he employed to construct boats to run under his patent-right, and which he had contracted to furnish to some steam-boat companies, he was involved in losses to a very great amount. Owing to these circumstances, though he

lived without ostentation or extravagance, he left his estate most excessively involved. His patent-rights are so far expired, that if the law afforded a protection which would ever have rendered them of any value, they would now be worth nothing:—and although Mr. Fulton has not lived to see the fulfilment of the anticipations of Mr. Emmet, yet, certain it is that, unless some stability be given to the exclusive grants from this state, the only patrimony of his children will be, that load of debt which their parent contracted in those pursuits, that ought to command the gratitude, as they do the admiration of mankind.

Mr. Fulton was about six feet high. His person was slender, but well proportioned, and well-formed.—Nature had made him a gentleman, and bestowed upon him ease and gracefulness. He had too much good sense for the least affectation; and a modest confidence in his own worth and talents, gave him an unembarrassed deportment in

all companies.—His features were strong, and of a manly beauty: he had large dark eyes, and a projecting brow, expressive of intelligence and thought: his temper was mild, and his disposition lively: he was fond of society, which he always enlivened by cheerful, cordial manners, and instructed or pleased by his sensible conversation:—He expressed himself with energy, fluency, and correctness, and as he owed more to his own experience and reflections, than to books, his sentiments were often interesting from their originality.

In all his domestic and social relations he was zealous, kind, generous, liberal, and affectionate. He knew of no use for money but as it was subservient to charity, hospitality, and the sciences. But what was most conspicuous in his character, was his calm constancy, his industry, and that indefatigable patience and perseverance, which always enabled him to overcome difficulties.

He was decidedly a republican. The determination which he often avowed, that he would never accept an office, is an evidence of the disinterestedness of his politics; but his zeal for his opinions or party, did not extinguish his kindness for the merits of his opponents. Society will long remember and regret him; but he will be most lamented by those, by whom he was best known.

March 9th, 1817.

As you have justly observed, in your very valuable Memoir, Mr. Fulton was of a slender, delicate constitution: connected with this frame of body, he possessed great sensibility of nervous system, attended with all those external marks, which constitute what physicians denominate, the *melancholic temperament*.

But while to this susceptibility of impression, is to be ascribed much of the activity of mind, quickness of perception, and fertility of invention, which characterized our friend; to the same source may be attributed the predisposition to those bodily diseases, with which he was afflicted, at different periods of his life; as well as the violence and severity with which he was assailed in his last attack.

At about eighteen or twenty years of age, in consequence of exposure to cold, Mr. Fulton was attacked with an inflammation of the lungs;—this was succeeded by a spitting of blood, and other symptoms indicating a disposition to pulmonary complaints: under these circumstances, at the same time that he was influenced by other views, he was induced, by the advice of his friends, to make a voyage to Europe.

This had the effect of restoring him to health, which he continued to enjoy until the time, when in France, he commenced his first experiments upon steam-boats. The accidents and disappointments which attended his first

essays upon this subject, may be considered as the exciting cause of those diseases of the digestive organs, with which he was afterwards affected, the greater part of his life.

In one of the first experiments referred to, Mr. Fulton was unfortunate, owing to the difficulty of adjusting the due proportion between the weight of the boiler and the size of the boat :—she went to the bottom :—upon receiving the information from his servant, that his boat had gone down, he was very much agitated, and immediately went to work, making the most laborious exertions, for twenty-four hours, without refreshing himself with a single meal in that space of time ;—by the exhaustion consequently upon this inordinate exertion both of mind and body, his stomach became debilitated :—dyspepsia, with all its attendant symptoms, ensued; except that his mind remained free from that depression and irritation which so frequently accompany similar affections of the digestive organs : I may say, such was his amiable temper of mind, that with all its susceptibilities, constitutional and acquired; amidst all the changes and disappointments to which he was exposed in the prosecution of the various subjects which engaged his attention, his cheerfulness, and equanimity of spirits, never forsook him; indeed, so exclusively was his attention occupied by the peculiar objects of his pursuits, that he became in a great degree regardless of his bodily complaints, and of the means necessary to remove them.

Under these circumstances, as was to be expected, his disease increased, and was succeeded by an enfeebled state of the whole system.

During the summer of eighteen hundred and fourteen, his stomach became so much deranged, that he was in a great degree restricted to the exclusive use of animal food, and a glass of weak brandy and water as the principal drink at his meals.

The liver also partook of the debility, which was primarily confined to its associate organ, the stomach: an obstruction of that gland was the consequence;—his bowels, deprived of their accustomed stimulus, the bile, became torpid.—He was now compelled to give more attention to his disease, than he had hitherto done:—he avoided company, declining all the invitations of his numerous friends;—observed the strictest regularity in his meals:—abstained from suppers, and retired to rest at an early hour: yet, with all these restrictions, his active mind kept its supremacy, and occasionally refused to submit to the discipline which his own good sense, and the advice of his physicians and friends, thought necessary to impose.

Under the impulse of a new thought, he was frequently deprived of sleep, and, in some instances, passed the whole night, pursuing the chain with which it was connected. It is said of Mr. Pope, that he frequently arose

from his bed to secure on paper the new creations of his ever watchful imagination; but no poet possessed a mind more tremblingly alive upon the peculiar subjects of his pursuit than Mr. Fulton:—indeed, we may almost say, that his ceaseless exertion of intellect, exhausted his bodily powers.

During the last three years of his life, Mr. Fulton was afflicted with two attacks of an inflammation of the lungs, attended with a severe cough, and pain in the chest; these readily yielded to the ordinary means employed in complaints of this nature.

About a fortnight before his death, when at Trenton, in consequence of fatigue and inordinate exposure, he again took cold, which as usual fell upon the lungs: although he was unfit to travel, and should have been confined to his chamber, the moment his business with the Legislature was concluded, he set out upon his return to New-York, accompanied with his friends, Mr. Emmet, Mr. John R. Livingston, and Mr. Sampson.

The Hudson was partly closed with ice. In consequence of the difficulty of crossing, Mr. Fulton was detained some time, waiting for a boat to convey them from Paulus Hook to that part of the river which was frozen. While he was thus detained at Paulus Hook, he visited his works, examined the boats then repairing for the following season, and spent not less than three hours in that occupa-

tion, exposed to very severe weather. This detention added to his complaints ; but this was not all :—when crossing the ice, Mr. Emmet fell through, and was in a situation attended with some danger. In this moment of peril, Mr. Fulton was exceedingly agitated, at the same time that his exertions to save his friend, left him very much exhausted : afterwards, continuing their walk across the ice, Mr. Fulton became very wet, owing to the quantity of water lying on the ice, in consequence of a fall of rain the preceding day. When he arrived at his house, he was hoarse, and almost unable to articulate. He was now confined to his bed for two or three days, when he was so far relieved, that he imprudently ventured to make a visit to New-Jersey, to see the state and progress of the steam-frigate, which, at that time, was the great object of his attention and solicitude. Although he did not leave his carriage, from the time he left his house, until he arrived at the works at Paulus Hook, this premature exposure proved the means of aggravating all his complaints, and induced a train of symptoms which, in his then debilitated state, resisted the advice of his physicians, and precluded all hope of recovery. A renewal of the inflammation of his lungs took place, followed by a large copious expectoration, partly purulent, and in part sanguineous : partial relief was obtained, and some faint prospect of recovery appeared ; but about six days before his death, the inflammation transferred itself from the windpipe and lungs, to the external parts of the neck and lower jaw : a tumour took place, apparently of

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said no more, but let experience determine whose principles are soundest; had not Mr. Fitch asserted, I got a small knowledge I have of steam-boats from him. By the respectable testimony of his Excellency General Washington, Governor Johnston, and by certificates and affidavits of many other gentlemen, hereunto annexed, I prove that mine was nearly matured before steam had entered his imagination, by his own confession to Governor Johnston: nor was my priority of use unknown to Mr. Fitch, for General Washington informed him, "though he thought himself not at liberty to disclose my principles, yet he would assure him his thought was not original, and I had mentioned the application of steam to him before; and, therefore, he declined giving him (Mr. Fitch) an introductory letter to the Legislature of Virginia."

The publication consists chiefly of a great variety of affidavits and certificates, to which are annexed a number of the most respectable names, which seem to prove that Mr. Ramsay perfected a steam-boat in the year 1784; that in November of the same year, he disclosed his plan to General Washington, who, afterwards, refused to give Fitch a recommendation to the Virginia Legislature, on the ground that Mr. Ramsay, and not Mr. Fitch, was the first who thought of applying steam to navigation. That upon the strength of this information, from General Washington, which was communicated by him, in answer to a letter from Governor Johnston, who was then Chairman of a Commit-

tee of the Legislature of Virginia, to which was referred a petition of Fitch, the committee refused to report in favour of granting to Fitch an exclusive right. Rumsay built a boat in 1785. That in 1786, an unsuccessful experiment was made with her : but her machinery having been rendered more perfect, she moved in the Potomac, in December, 1787 : that she moved at the rate of three and four miles an hour, when she had two and three tons weight on board, independent of her machinery, which weighed no more than eight hundred. That her boiler had no more than five gallons' capacity, and needed only one pint of water at a time : that the whole machinery did not occupy more space than the bulk of four barrels of flour, and that she would only consume from four to six bushels of coals in twelve hours. The dimensions of the boat are not mentioned ;—but it may be estimated, from certain measurements which are given, that she was fifty feet long. It appears, that she was propelled in the same way as the boat which Mr. Rumsay afterwards constructed in London ;—that is, by forcing the water, by means of the steam-engine, through a trunk in the bottom of the boat ;—this method Mr. Rumsay thinks greatly preferable to the paddles used by Mr. Fitch.

The controversy between Mr. Fitch and Mr. Rumsay, was, as to the right of invention, on which ground they were both applicants to the Virginia Legislature, for an exclusive grant. The above-mentioned work is in the

New-York Historical Society Library, among the State's papers.

In the second volume of the *Columbian Magazine*, for the year 1788, is "an explanation of a new constructed boiler for generating steam, in great quantities, with very little fuel, invented by James Rumsay, in the winter of 1785." This we may presume is the boiler which Mr. Rumsay used in his steam-boat. "It consists of iron pipes bent so as to cross each other, at right angles, forming cavities like a bottle case, in which the fuel is burnt." The modern improvements in the art of generating and applying steam, show us, that Mr. Rumsay's boiler was constructed on the most mistaken principles. The greatest part of the heat escaped: whereas, that boiler is certainly the best, which transfers to the water the greatest portion of the matter of heat which the combustion of the fuel will afford.—It does not appear that this boat of Mr. Rumsay, or the one he constructed in London, served any other purpose, than to make some unsatisfactory experiments. He, like Mr. Fitch, appears not to have been convinced, from the trials of his plans, that they could be made practically useful. We learn, from the publication of Mr. Rumsay, first above-mentioned, that one idea he had, was, to apply the power of a steam-engine to long poles, which were to reach the bottom of the river, and by that means to push a boat against a rapid current.

In the Memoirs of Dr. Lettsom, by Mr. Pettigrew, lately published in London, we find the following notices of Mr. Rumsay and Mr. Fitch.

The first is a letter from Doctor Benjamin Rush, of Philadelphia, to Doctor Lettsom, which is as follows :—

Philadelphia, May 4, 1788.

DEAR SIR,

Nothing but a matter deeply concerning the interests of science and justice, should have induced me to trouble you with a letter by the packet.

A certain Mr. Rumsay, from Virginia, (strongly recommended by General Washington,) lately produced a plan of a machine in our city, for improving the steam-engine, by reducing the fuel consumed by them to an eighth part of the usual quantity. This plan, it is suspected, has been copied, with a few trifling variations, by a person in this city, (equally known for plagiarism in philosophy, and a licentious opposition to the proposed constitution of the United States,) and transmitted to Mr. Bolton, of London, with a view of obtaining a patent for it. The only design of this letter is to request you to suggest the above information to Mr. Bolton, and to assure him that proper vouchers will be sent to him by Captain Willet, or Captain Sutton, in a few weeks, which will irrefragably prove, that the sole honour of the invention belongs to Mr. Rumsay, and that if any emolument is to arise from it, he alone is entitled to it.

Mr. Ramsay possesses a very uncommon mechanical genius. He has invented a boat which sails, by means of steam, four miles an hour, against the stream; he expects to increase the velocity of this boat to ten miles an hour, by the application of the principles of his new steam engine to the discovery. His modesty is equal to his talents for invention. In behalf of his friends (who are among the worthiest citizens) I write to you in his favour. Your name and character are well known in our city. We look up to you to protect genius, to detect and defeat fraud, and to reward industry and integrity in a country which has exhibited so many shining examples of them all in the promotion of science.

Many thanks to you for the seeds of the Mangel Wurzel. I have distributed them extensively. To our great and good Virginia farmer, General Washington, I have sent the largest number of them. I have likewise published, in our papers, an extract from your preface to the third edition of the pamphlet respecting the English mode of cultivating them.

I am, Yours, &c.

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The second is a letter from William Thornton, Esquire, now of Washington, dated July 26, 1788, from which the following is an extract:—

“I find the company, of which Mr. Rumsay is principal, has procured a letter of introduction to thee from our good and worthy friend, Dr. Rush. He pretends (Rumsay I mean) to be the inventor of the steam-boat. I have, however, enclosed thee a couple of pamphlets, proving he got it from Mr. Fitch, of Philadelphia. These pamphlets were published before I had any thing to do in the affair, and on becoming acquainted with it fully, I purchased four shares, or one-tenth, of Mr. Fitch's discovery. The boat is to be tried this evening or tomorrow, and I will endeavour to give thee an account of it. Ours is moved with paddles placed at the stern, and worked by a small steam-engine. We have exclusive patents for Pennsylvania, New-Jersey, Delaware, Virginia, and New-York, in which are included the principal rivers. The Potomac will be navigable, it is expected, in a few months.”

on and Superintendence of

r wheel.		Tonnage.	When built.	Where employed.
of Bucket.	Dip.			
4	2	160	1806	Hudson River.
		120	1807	Rariton River.
4	2.4	295	1807	Hudson River.
.4	2.6	331	1811	Hudson River.
.6	2	118	1812	From New-York to Newburgh.
4	2		1812	Ferry Company.
9	2.6	370	1813	Hudson River.
1	2.3	275	1813	Potomac River.
1	2		1813	Ferry Company.
1	2		1813	Brooklyn Comp'y.
10	2.6	327	1813	L. I. Sound.
4	4	2475	1814	Navy Yard.
			1816	Between N. Y. and New-Brunswick.
10	2.6	330	1816	Undetermined.
10	3	526	1816	Hudson River.

SMITH.

APPENDIX.

THE following Documents, connected with subjects noticed in the preceding Biography, the publishers have thought would be interesting to the public, and they are therefore subjoined.

LETTER FROM ROBERT FULTON, ESQUIRE.

To Gouverneur Morris, Esq. President of the Board of Commissioners of the Western Canal.

NEW-YORK, February 22d, 1814.

SIR,

Numerous engagements have hitherto prevented my paying that attention to the report of the commissioners which the importance of the subject merits; but that you may have evidence of my desire to give all the aid in my power, to an enterprise so sublime, (for I deem that a sublime national work, which will secure wealth and happiness to millions,) I have committed to writing some observations, which, should you consider them of any utility, you will make use of, as you think proper.

In the report of March, 1812, page 9, the commissioners gave calculations on the expense of conveyance by canals, which calculations were drawn from the experience acquired on canals in England, as to the quantity of work that two horses and three men could do in eight hours; to which, adding the wear and tear of the boat

and canal, the decay of horses, and interest on the capital expended in purchasing horses and boats ; also the profit on the boat, and the wages, which are higher in this country than in England, it is shown that the total expense amounts to no more than one cent per ton per mile. As I passed three years at various canals in England, to obtain practical knowledge on the manner of constructing them, and to make myself familiar with their advantages, and was well acquainted with some of the best engineers, I know this calculation to be correct. Hence one cent per ton per mile, is one dollar a ton for 100 miles, while the usual cost of waggoning is one dollar and sixty cents per hundred weight for 100 miles, or thirty-two dollars a ton. It consequently follows, that on a canal, a ton weight could be boated 3200 miles for the sum now paid to waggon it 100 miles ; and the persons at 3200 miles from a good sea-port, would have all the advantages of trade, or of bringing their produce to market, which those who reside only 100 miles from market now enjoy, provided the canal were toll free.

Therefore, as cheapness of transport, united to safety and certainty, are the great objects of all public improvement, in canals, rail-ways, and roads, the one cent per ton per mile is the most powerful argument in favour of canals, and must ever be present in the mind of the political economist, in all his reflections and reasonings on the advantages of such works. From this one cent per ton per mile, I will draw some interesting calculations on the

present price of freight in sloops on Hudson's river, between New-York and Albany, and show that it could be done much cheaper by a canal: the proof of them will be conclusive, that if a canal can give advantages superior to sloop navigation on Hudson's river, which is one of the most rectilinear and best in the world, the benefits to be derived from the one contemplated must be vastly superior to every kind of road, river, or lake communication from Lake Erie to Hudson's river.

The usual price of freight from Albany to New-York, is,			
For a barrel of flour, from	-	-	2s. to 2s. 6d.
do. do. Pot-ashes,	-	-	3
do. do. Pork,	-	-	3

To avoid errors, I will state the average charge at 2s. 6d. the barrel, and allow ten barrels to one ton weight.* Thus, a canal boat of fifty tons, would carry five hundred barrels, which at ten dollars a day in expense, and twenty miles in speed, would arrive from Albany in eight days for eighty dollars, and as stated in the report referred to, would amount to one cent per ton per mile, or one hundred and sixty cents for ten barrels from Albany to New-York; equal sixteen cents a barrel, instead of thirty, paid to sloops, thereby producing a saving of fourteen cents a barrel, or one hundred and forty cents a ton.

* Pot-ash and beef barrels weigh more than flour; but cotton bags and bales of dry goods weigh less: for equal bulk, the flour barrel is a fair average.

It is now to be seen what this economy would amount to on the whole number of tons carried on Hudson's river in one season. From the returns of the custom-house, I find that four hundred sloops or vessels of every description are employed, averaging sixty tons burden; those that trade to Albany make eleven trips up, and eleven trips down, in a season; those that trade to Newburgh, Poughkeepsie, and other landings, make more voyages; and hence, the whole may be averaged as equal to twenty-one trips between New-York and Albany. Each sixty tons a trip, would amount to one thousand two hundred and sixty tons a year, and the four hundred vessels would carry five hundred and four thousand tons of every kind of material. But as they return from New-York not more than half loaded, I will estimate the average trips at forty-five tons, or a total freight of thirty-nine thousand three hundred tons; on which the economy of one hundred and forty cents a ton, gives five hundred and fifty thousand two hundred dollars in favour of the canal; which is interest at ten per cent. for five millions five hundred and two thousand dollars, equal thirty-four thousand three hundred and twenty-seven dollars a mile for constructing the canal, a sum more than sufficient for that purpose.

If it be admitted that the four hundred sloops cost on an average each three thousand dollars, their capital is one million two hundred thousand dollars, on which the wear and tear, at fifteen per cent. is one hundred and eighty thousand dollars a year.

A canal boat of fifty tons, can make a trip to and from Albany in twenty-four days, allowing time to load and unload; in which time she would transport seventy-five tons, allowing only one-half for return cargo; she could make eleven such trips in a season, carrying eight hundred and twenty-five tons; and four hundred and seventy-seven boats would be adequate to the transport of the three thousand and ninety-three tons before estimated for the sloops. Each canal boat would cost five hundred dollars, and the total number two hundred and thirty-eight thousand five hundred dollars, instead of one million two hundred thousand dollars, the expense of the sloops. On the canal boats, the wear and tear would not be more than ten per cent. because there are no sails or cordage. These annual repairs would therefore be twenty-three thousand eight hundred and fifty dollars, instead of one hundred and eighty thousand dollars, the repair of the sloops; giving an economy of one hundred and fifty-six thousand one hundred and fifty dollars a year on wear and tear only. The other great expense of sloops or river craft over that of canal boats, is in cost and wages. Sloops which cost from three to five thousand dollars, require men of some capital to build them, who expect at least twenty per cent. per annum on their first cost; that is, on the one million two hundred thousand dollars, two hundred and forty thousand dollars. A river vessel must also have a captain and pilot of some talents and consideration, with pay superior to canal boatmen. The river vessel

must have more hands to do the like quantity of work ;
 hence the four hundred captains, averaging a pay of five
 hundred dollars each per annum, which is one hundred
 and twenty dollars more than received by canal boatmen,
 is, per annum, \$ 48,000

The superior number of hands to the sloops,
 may be estimated at one to each sloop, whose
 wages, three hundred and sixty-five dollars a
 year, is* \$ 146,000

\$ 194,000

Economy of interest on capital, as before sta-
 ted - - - - - \$ 156,100

Interest to the owners of the sloops on
 the capital advanced at twenty per cent. \$ 240,000

\$ 590,000

This result approaches the advantages in fa-
 vour of the canal as before stated.

That the owners of water-craft must have
 this twenty per cent. on their capital is ob-
 vious ; for if an old stone sloop cost six
 hundred dollars, and has but two men
 and a boy, twenty per cent. would be
 but - - - - - \$ 120

* Although the sloops are worked only eight months, the earnings
 should be such as to maintain the man for a year.

Admitting the captain's wages to be superior,

captains having more, - - -	\$ 400
Pilot, - - - - -	\$ 300
Boy, - - - - -	\$ 200
Wear on the sloop at fifteen per cent. -	\$ 90

TOTAL, \$ 1110,

for the maintenance of 3 persons and their families, also interest on the capital, and the wear of the sloop.

But if the present population gives this important trade to 160 miles of sloop navigation, may we not look forward with perfect confidence to that of the next 90 years for producing a trade which, if required, will pay ample interest on the capital to be expended in executing the canal.

Had it pleased the Author of the Universe to have drawn Hudson's river from Lake Erie, a calm and gentle stream of 10 feet water, the reflecting mind would contemplate with gratitude the Divine munificence ; and he who feels, that 160 miles of navigation on Hudson's river is a blessing to this state, would compare the successive range of extended benefits, and draw exact estimates of national wealth from 160 miles of easy communication to the western extremity of Lake Superior.

For if Hudson's river, collecting freight from its surrounding country, and an interior not more distant than

Cayuga or Ontario, now bears on its waters near 400,000 tons per annum, where shall the mind be arrested; on what number of tons shall it dwell? when coming from the population of the next 20 years, and the countries which surround Lake Superior, Michigan, Huron, and a canal of 300 miles through a fertile country? Compared with the trade now on Hudson's river, it cannot be less than a million of tons each year: *And for the following reasons*: Where the canal unites to the Hudson's river, the man who lives 10 miles from the river and 10 from the canal, will, when he has his produce in a waggon, go direct to the river; but he who lives 30 miles from the river and 5 from the canal, will carry it to the canal; and he who lives 50 miles from the river, will go 30 to the canal; he who lives 300 miles from the river, will waggon his produce 100 miles to the canal; thus the canal would draw in the trade of a country forming a triangle, with a base line 200 miles long, and from thence to the apex 300 miles, equal a range of country 300 miles long, 100 miles wide, or 30,000 square miles.

Equal,	Acres, 19,200,000
Lake Erie will draw in the trade for 100 miles round its margin; Huron and Michigan from a like distance; Lake Superior from 150 miles; all of which may be estimated at	30,000,000

Total,	Acres, 49,200,000
a quantity, if I recollect right, not far short of the whole	



of England. (Arthur Young states, England, Ireland, and Scotland to contain 90 millions of acres.)

The population of England is about one soul to 6 acres, and there can be no doubt that the time will come when the population in the countries here indicated will be 1 to 10 acres, or 4,920,000 persons; a number equal to half the population of England, whose industry and necessities must cause more than one million of tons to move through the canal in a season; which million of tons, carried at so low a rate as to enable every thing useful to come to market, would produce abundant interest on the capital expended; for at one cent a ton per mile in expenses, the transport on 300 miles of canal, would

Cost,	\$ 3 00
And from Albany to New-York,	2 50
Total,	\$ 5 50

or 55 cents a barrel. If then 50 cents for toll were charged on each barrel, or 25 cents a hundred on merchandise and other materials for passing through the canal, still the barrel or 200 weight would arrive at New-York for 1 dollar 50 cents; which 50 cents toll or 5 dollars a ton, would, on one million of tons, give 5 millions of dollars a year, or 50 per cent. for 10 millions to make the canal. Admitting that from Lake Superior to the commencement of the canal at Lake Erie, the expense should be 1 dollar a barrel, it would arrive at New-York, from that distant region, 1,600 miles, for two dollars; the price which it

now costs to waggon a barrel of flour about 130 miles, at which distance the expense of coming to market checks agriculture and the improvement of the country. Therefore this canal and passage through Lake Erie into Lake Superior will ever be cheaper than transport on our much admired river Mississippi, even when she shall have the advantage of steam-boats. For from Louisville to New-Orleans, a distance of 1,545 miles, the freight is 1 dollar 50 cents a barrel, but to come up from New-Orleans to Louisville, it is four and a half dollars a hundred weight, or 9 dollars a barrel.

Hence this great work would, as a lucrative speculation for a company of subscribers, be superior to any banking association or incorporated body now known, and in every point of view is worthy of this great state; by drawing forth its resources and those of other states into and through this state; as a source of abundant revenue obtained by the economy of labour, and consequently a clear gain to the state; as a means of strength by consolidating population; as an immense object of real glory; a vast and noble example to our sister states. Such are the conquests worthy of a great and enlightened people; conquests as lasting as the waters that nourish them, and of which we could never be deprived.

All that is honourable of the fame of Louis the XIVth is the canal of Languedoc and his public highways. His military conquests were lost before he died; his canal and roads alone remain blessings to France.

Not more than 40 years ago, the Duke of Bridgewater, regardless of public prejudice, constructed the first canal in England, in length about 30 miles; it gave him immortality and 130,000 dollars a year. His success and good example have been the cause of many hundred miles being since executed in various parts of the kingdom, on which the easy conveyance of the ponderous articles of agriculture, manufactures, and commerce, has greatly promoted the improvements of that country, and added to her wealth and power.

It is a curious fact, that his canal runs nearly parallel to the river Mersey, the former channel of communication from Manchester to Liverpool; it was, therefore, thought absurd to contend that a canal should rival river navigation; as some persons now believe it visionary to cut a canal any where bordering on our lakes. The river was an imperfect navigation, embarrassed by uncertainty and risk; the canal was without risk, and certain to deliver the goods at a given place in the appointed time; it therefore drew the trade from the river, and left it a deserted stream. In fact, that a communication may be perfect, the trade must pass with equal ease each way; it must not be subject to the impediments of calms or contrary winds on the lakes; or what is worse, to *freshets, floods, or shoals*, which are common to fresh water rivers.

But seeing our vast lakes and rivers, there is nothing more natural, than to associate the idea of navigation

with them, and lead the mind on through locks to Ontario, and along the St. Lawrence to Quebec. The best of all practice, however, the practice of English and Dutch canals, has proved how vastly inferior such communications are to the one contemplated ; and the calculations which I here submit, will, I hope, make it clear to every unbiassed mind. But were the conveyance by the lakes and St. Lawrence more perfect than it ever can be, and Canada ours, it could never be good policy in New-York, to let so immense a trade go by that course, to the infinite injury of this state. I have shown, and I hope clearly, that were the intended canal to cost 10 millions of dollars, it would, in a few years, produce 5 millions. Then it would pay its capital in less than four years, and give a revenue to this state without a tax, of from 3 to 5 millions a year ; with which income this state might proceed with other and greater improvements to its own glory, and incalculable benefit. A canal is, in reality, like a great labour-saving machine in the possession of a prudent and skilful manufacturer ; the economy and profits of which are applied to extending his works and increasing his capital. Here the state is proprietor, and possesses the capital to execute a work, which I do not hesitate to say, would be an inexhaustible mine of wealth, that in a few years would give to this state the most refined order of public improvement. For if my calculations be correct, and I challenge any one to confute them on principles of increasing population and industry, the canal yielding 5 millions a year, would, in twenty years,

give one hundred millions, to be expended in canals, bridges, roads, and improvements. What could be done with 100 millions of dollars? All reflecting men can conceive and calculate.

By this statement you will perceive, that I am not for a canal free of toll. My reason is, that the whole inhabitants of the state being responsible for the necessary funds to construct it, or the interest thereon, they who benefit by the canal should pay such toll as will return the interest; and not only so, but they should pay at least as much toll as I have stated, which still leaves them an immense advantage in coming to market, yet produces an ample fund for other improvements. It is therefore, I think, evident, that if a reasonable toll can produce an annual income, which in time will improve the whole state, it is the interest of the whole state that the canal should be made and the toll laid.

My estimate of one million of tons a year is, for 9 months, equal 3703 tons a day, or 74 boats a day. To pass the locks at 12 minutes for each boat will require from 14 to 15 hours, or a double range of locks. On this subject, and the manner of executing the canal, I will, perhaps, at a future day, trouble you with another letter.

I am, Sir,

Respectfully,

Your most obedient,

ROBERT FULTON.

GOUVERNEUR MORRIS, ESQUIRE, TO
ROBERT FULTON, ESQUIRE.

Morrisania, March 3, 1814.

SIR,

I have this moment received your letter of the 22^d of last month, which I consider so valuable, that I shall transmit a copy to Albany, that it may be communicated to members of the legislature, without stopping to examine minutely your calculations, in the persuasion that they are substantially correct: moreover, the basis being established, the only difference as to results must be about the more or less, while the least is sufficient for your general conclusion. You show that this canal will be, to the state, a mine more valuable than those of Potosi to Spain. I have never ventured to develop what my judgment contemplated from this measure; because I had learnt, from experience, that results of a certain magnitude, even when bottomed on mathematical demonstration, are treated as light and fanciful by those who measure the whole world with the limited standard of their own comprehension. The benefits to result from canals, which may at a trifling comparative expense be made through different parts of the state of New-York, were a subject of my serious meditation, many years before I ventured to disclose them; and even then, the project was treated more like the dream of a schemer, than the matured reflection of a sound mind.

The money produce which you exhibit is not the greatest advantage which I have been led to expect. Improvements assist each other, and contributing to mutual advancement, tend to general perfection. The great vivifying principle, on which a thousand astonishing consequences depend, is this, that whatever saves labour rewards labour. And permit me to remark on this occasion, and in this place, that among the wonderful effects which a full developement of this principle has produced in Great-Britain, it is not the least, that after twenty years of war expense, at the beginning of which many, who are considered as models of political wisdom, declared her to be on the verge of bankruptcy, after the proud and generous defiance of a world in arms to rescue a world in chains, she gives this year between forty and fifty millions of dollars to the continental powers who, though they have long enjoyed the continental system devised for her ruin, are unable to defend themselves without the aid of her treasure.

I say it is this great vivifying principle on which that nation's wealth and power depend, that every thing which saves labour rewards labour. By diminishing its money-price, it occasions a new diminution, each effect becoming a cause, so that each is a step in the ladder by which she ascended to the pinnacle of prosperity. I say the money-price to distinguish it from the real price; for money is but an instrument of transfer in the bank accounts of political economy. The pecuniary stipend of a labour-

ing man represents his house-rent, fuel, food, and raiment. In proportion, then, as these articles which form the real stipend are reduced to their money-price, his labour can bear a similar reduction. But, causes preceding effects, every such reduction contributes, in the first instance, to his ease and comfort; and only affects, consequentially, the price of his labour, by the competition of his brethren. Thus, the canal which brings fuel from one quarter, food from another, the national accumulation of wealth which, lowering the rate of interest, lessens the rent of houses, built more cheaply also from materials more cheaply collected by workmen, more cheaply paid, the labour-saving machines which supply cheaper clothes and tools from raw materials brought by canals, more cheaply to the manufactories, all the causes working together, make the Englishman's shilling nearly equal to the American's dollar: enabling him, therefore, to sell for a shilling, what, by the high price of labour consequent on the manner and expense of living, is not made here for less than five such shillings, or one of our dollars. Now it is self evident, that in a general competition for any one article, they will get most of it who will give most for it. It follows, therefore, that those who will give the most for money; in other words, those who sell cheapest, will have the most money.

In relinquishing the large revenue of which the canal will undoubtedly be susceptible, I contemplated two objects distinct though connected. First, that the more

cheap shall be the transportation, the more extensive will be the theatre of its operation; and, secondly, that the greater shall be the mass of the products which it brings down, the greater will be the commercial interchange of returning merchandise, and the greater the encouragement to manufacturers by the increased cheapness and comfort of living, together with the cheapness and abundance of raw materials. It is here that I look for ample compensation to those parts of the state which seem to be less interested than our western district, but which are far more interested than they seem. You, whose mind has long been turned to the contemplation of such objects, will not be surprised when I tell you that I believe the effect of our proposed canal will make the shores of Hudson river, in fifty years, almost a continued village. Compare the country from Albany to Waterford, with what it was in one thousand seven hundred and eighty-five. Look also at the effects already produced by your steam-boats.

But it is needless to discuss now the best mode of managing that great concern. You show that it may be made to produce a vast revenue, while conferring inestimable benefit on our neighbours. This is sufficient. If afterwards it appears that lowering the toll, and thereby increasing and extending that benefit, would be still more advantageous, the legislature will act accordingly.

I am, Sir, your obedient servant,

GOUVERNEUR MORRIS.

THE Commissioners appointed in and by an act of the Legislature of the state of New-York, to provide for the internal improvement of the state,

BEG LEAVE TO REPORT :—

That in compliance with their official duty, having made the fullest inquiries and investigations in their power, they have appointed an engineer to trace out the course, and estimate the expense of the proposed canal; as, also, to superintend such portion of the whole line as may be approved of by the legislature. He would probably have arrived before the present hour, had impediments to an intercourse with Great Britain been removed.

They sought a proper character in that country, preferably to any other, because from its extensive interior communication by canals, railways, and other expedients, they expect that a more intimate knowledge of useful facts can be obtained there than elsewhere; and because an Englishman speaking the same language, and habituated to the same usages and manners, will more easily acquire information among us, and be less liable to imposition.

On the arrival of the engineer, the commissioners will immediately direct such surveys to be made, as may be necessary, in order to ascertain the exact line of the canal from Lake Erie to the Hudson; and when this work is completed, the estimates of the engineer shall, as soon as possible, be laid before the legislature, who will then be

able to form such a decision as will best promote the prosperity of the state.

The commissioners have, in the mean time, caused further investigations to be made, and would not have suspended the surveys, as they did during the last summer, but for military operations which are not favourable to internal improvement. They have, however, the satisfaction to state, that every examination tends to show, not only the practicability, but the facility of this enterprise; so far as the term facility can reasonably be applied to a work of such magnitude. They add, with much pleasure, that it will not be difficult to extend this communication to the fertile vales watered by the Susquehanna and its wide spreading branches. Hence, they presume, that the public spirit which has always characterized Pennsylvania, will, at a proper time, induce her to co-operate. It may, indeed, be objected, that, to facilitate the intercourse of a commercial rival, may be of more comparative loss, than positive advantage. But far be such jealousies from the councils of New-York: Marked by nature for greatness, she will always feel that nobleness of soul which would rather accelerate than retard her neighbour's prosperity.

The commissioners cannot quit this branch of the subject, without stepping a little out of the road in which they ought strictly to walk, for the purpose of expressing their belief, that the communication long since contem-

plated, between Lake Champlain and Hudson River, may easily be effected; and, thus, another of those great avenues be opened, which Providence has so well prepared, that little more is left for the state, than merely to will the possession of wealth and power.

The commissioners have, also, conformably to the powers conferred on them, applied for and obtained grants of land, a schedule whereof is annexed to the report. It would be improper not to acknowledge the liberality of the grantors; but it would be doing injustice to their intelligence, should it be doubted, that a prudent regard to their own interest had its proper share in their determinations. The clear-sighted perception of mankind; respecting matters which affect their property, opened to their view the benefits which they must derive from this extensive inland navigation. They, as a part, see and feel what the state, as a whole, must acquire by it; and the solidity of their opinion is less to be questioned, as the light, in coming to their mental vision, has neither been intercepted by the opacity of dull conception, nor refracted by passing through the medium of misrepresentation.

The value of these lands will increase by every year of approaching settlement, and every avenue of amended access, whether by improving old roads or making new ones. We may, therefore, safely calculate, that in the course of twenty or thirty years, the proceeds of

these lands will reimburse to the state no small portion of the expense it may incur by completing the whole line of the proposed canal; and here we must remind gentlemen, of what has frequently occurred to their own reflection, that although twenty or thirty years be a large portion of individual existence, they form but a short period of national duration.

The commissioners have also performed the duty of attempting a loan in Europe, conformably to the terms and within the limits prescribed. They have reason to believe, that their efforts would have been crowned with success, had not the declaration of war been nearly simultaneous with the grant of authority to make a loan. The attempt having failed, no farther measures have been adopted in relation to this object.

The commissioners having thus rapidly recited facts, which it is their duty to communicate, would be wanting to the public interest, did they not notice attempts to excite opposition to the work committed to their charge. They have examined in their preceding reports the reasons advanced by its opposers, and would endeavour to answer other reasons, if any such they could hear of. In the face of incontrovertible facts the supposed superiority of what is called the natural communication, by Lake Ontario, has been strongly insisted on, and of late the prodigious advantage of carrying on the internal trade of America, through the sea-ports of the St. Lawrence; was

ostentatiously displayed to prove, that a canal through the Western District of New-York is an idle project.

These gentlemen could not indeed deny, that there is some risk in navigating the lake, and some difficulty in descending the river; but neither the risk nor the difficulty, nor both combined, are considered as serious obstacles. To men of such sanguine temper, it is useless to observe, that this communication would be much more expensive than the one contemplated, and that it is closed from November to May by the rigid laws of Nature; but what are the laws of Nature to gentlemen enamoured with their own conceptions. Disdaining to consider the actual state of things, whenever map-makers trace a stream, they find a military and commercial highway. Should there be a want of water, it is supplied by their depth of intellect; should the surface be covered with ice, it is thawed by their warmth of imagination. To contend with such men is no easy task, for they make facts as they go along, and reasons they disclaim; insisting, that whatsoever they think proper to dislike, is absurd. From these decrees, pronounced with an air of censorial gravity and the contemptuous smile of superior intelligence, they admit of no appeal. Far from imitating them, the commissioners will not have the hardihood to question their sagacity, neither will they, after industriously applying the share of common sense allotted to them by the Divine Goodness, to the object of their appointment, pretend, even on that subject, to vie with

gentlemen, whose privilege it is to understand, and whose prerogative to decide, according to the inverse proportion of their knowledge. With all due deference, nevertheless, to such ethereal minds, we are constrained, by stubborn habit, to adhere to the opinions of intelligent professional men. And here the commissioners beg leave to remark, that they are much misunderstood, when it is supposed, that they recommend, *exclusively*, a canal descending according to the level of the country like an inclined plane. On the contrary, their project embraces the system of locks as well as the other, and their opinion is, that the operation must be regulated by the nature of the country, taking into view the diminution of expense and the shortening of distance. And they beg leave to call to the recollection of the legislature, the decided opinion of Mr. William Weston, one of the most eminent civil engineers in Europe, who was formerly employed by the Inland Lock Navigation Company of this state, and who is perfectly acquainted with the country. In a letter to one of the commissioners, he says, "Should your *noble but stupendous plan* of uniting Lake Erie with the Hudson, be carried into effect, you have to fear no *rivalry*. The commerce of the immense extent of country, bordering on the upper lakes, is yours for ever, and to such an incalculable amount, as would baffle all conjecture to conceive. Its execution would confer immortal honour on the projectors and supporters, and would in its eventual consequences render New-York the greatest commercial emporium in the world, with

perhaps the exception, at some distant day, of New-Orleans, or some other *depot* at the mouth of the majestic Mississippi. From your perspicuous topographical description, and neat plan and profile of the route of the contemplated canal, I entertain little doubt of the *practicability* of the measure. Perhaps this is the only question which the legislature should be particularly anxious to have resolved. The *expense*, be it what it may, is no object when compared with the incalculable benefits arising therefrom, though, doubtless, it will deserve attention, that the money granted liberally be wisely and economically expended."

All which is humbly submitted.

GOUVERNEUR MORRIS,
S. VAN RENSSELAER,
DE WITT CLINTON,
SIMEON DE WITT,
PETER B. PORTER,
THOMAS EDDY,
ROBERT FULTON.

SCHEDULE

Of cessions of lands agreed to be made to the people of this state, as a free gift for promoting the execution of canal navigation from Lake Erie to the Hudson.

Paul Busti, Esq. Agent for the Holland Com-	ACRES.
pany in behalf of said Company.	100,632

Le Roy, Bayard & M'Evers,	2,500
John Greig, Esq. in behalf of Governor	
Hornby,	3,500

Robert Troup, Esq. Agent for the heirs of Sir William Pulteney, will make a large grant in behalf of the heirs, as soon as his powers as Agent of that estate, which have ceased by the death of his constituent, shall be renewed.

And the commissioners have reason to expect considerable grants from other sources.

As soon as the deeds making those cessions are perfected, copies will be transmitted to the legislature.

STEAM-FRIGATE.

Report of Henry Rutgers, Samuel L. Mitchill, and Thomas Morris, the commissioners superintending the construction of a Steam Vessel of War, to the Secretary of the Navy.

New-York, December 28th, 1815.

SIR,

The war which was terminated by the treaty of Ghent, afforded, during its short continuance, a glorious display of the valour of the United States by land and by sea—it made them much better known to foreign nations, and, what is of much greater importance, it contributed to make them better acquainted with themselves—it ex-

cited new enterprises—it educed latent talents—it stimulated to exertions unknown to our people before.

A long extent of coast was exposed to an enemy, powerful above every other on the ocean. His commanders threatened to lay waste our country with fire and sword, and, actually, in various instances, carried their menaces into execution. It became necessary, for our defence, to resist, by every practicable method, such a formidable foe.

It was conceived, by a most ingenious and enterprising citizen, that the power of steam could be employed to propel a floating battery, carrying heavy guns, to the destruction of any hostile force that should hover on the shores, or enter the ports of our Atlantic frontier. The perfect and admirable success of his project for moving boats containing travellers and baggage by the same elastic agent, opened the way to its employment for carrying warriors and the apparatus for fighting.

The plan was submitted to the consideration of the executive of an enlightened government. Congress, influenced by the most liberal and patriotic spirit, appropriated money for the experiment, and the Navy Department, then conducted by the honourable William Jones, appointed commissioners to superintend the construction of a convenient vessel under the direction of Robert Fulton, Esq. the inventor, as engineer, and Messrs. Adam

and Noah Brown, as naval constructors. The enterprise, from its commencement, and during a considerable part of its preparatory operations, was aided by the zealous co-operation of Major-General Dearborn, then holding his head-quarters at the city of New-York, as the officer commanding the third military district. The loss of his valuable counsel in conducting a work which he had maturely considered, and which he strongly recommended, was the consequence of his removal to another section of the union, where his professional talents were specially required.

The keels of this steam-frigate were laid on the twentieth day of June, eighteen hundred and fourteen. The strictest blockade the enemy could enforce interrupted the coasting trade, and greatly enhanced the price of timber. The vigilance with which he guarded our coast against intercourse with foreign nations, rendered difficult the importation of copper and iron. The same impediment attended the supplies of coal heretofore brought to New-York from Richmond and Liverpool. Lead, in like manner, was procured under additional disadvantages. These attempts of the enemy to frustrate the design, were vain and impotent. All the obstacles were surmounted. Scarcity of the necessary woods and metals was overcome by strenuous exertions; and all the blockading squadron could achieve was not a disappointment in the undertaking, but merely an increase of the expense.

So, in respect to tradesmen and labourers, there was an extraordinary difficulty. Shipwrights had repaired to the lakes, for repelling the enemy, in such numbers, that, comparatively speaking, few were left on the seaboard. A large portion of the men who had been engaged in daily work had enlisted as soldiers, and had marched under the banners of the nation to the defence of its rights—yet, amidst the scarcity of hands, a sufficient number were procured for the purpose which the commissioners had in charge. An increase of wages was the chief impediment, and this they were enabled practically to overcome.

By the exemplary combination of diligence and skill, on the part of the engineer and constructors, the business was so accelerated, that the vessel was launched on the twenty-ninth day of October, amidst the plaudits of an unusual number of citizens.

Measures were immediately taken to complete her equipment; the boiler, the engine, and the machinery were put on board with all possible expedition. Their weight and size far surpassed any thing that had been witnessed before among us.

The stores of artillery in New-York not furnishing the number and kind of cannon which she was destined to carry, it became necessary to transport guns from Philadelphia. A prize, taken from the enemy, put some fit

and excellent pieces at the disposal of the navy department. To avoid the danger of capture by the enemy's cruisers, these were carted over the miry roads of New-Jersey. Twenty heavy cannon were thus conveyed by the strength of horses. Carriages of the most approved model were constructed, and every thing done to bring her into prompt action, as an efficient instrument of war.

About this time, an officer, pre-eminent for bravery and discipline, was commissioned by the government to her command. Prior to this event, it had been intended by the commissioners to finish her conformably to the plan originally submitted to the executive. She is a structure resting upon two boats and keels, separated from end to end by a canal fifteen feet wide, and sixty-six long. One boat contained the caldrons of copper to prepare her steam. The vast cylinder of iron, with its piston, levers, and wheels, occupied a part of its fellow; the great water-wheel revolved in the space between them; the main or gun-deck supported her armament, and was protected by a bulwark four feet ten inches thick, of solid timber. This was pierced by thirty port-holes, to enable as many thirty-two pounders to fire red-hot balls; her upper or spar-deck was plain, and she was to be propelled by her enginery alone.

It was the opinion of Captain Porter and Mr. Fulton, that the upper deck ought to be surrounded with a bulwark and stanchions—that two stout masts should be

erected to support latteen sails—that there should be bowsprits for jibs, and that she should be rigged in a corresponding style. Under authorities so great, and with the expectation of being able to raise the blockade of New-London, by destroying, taking or routing the enemy's ships, all these additions were adopted and incorporated with the vessel.

. It must here be observed, that during the exhaustion of the treasury, and the temporary depression of public credit, the commissioners were exceedingly embarrassed—their payments were made in treasury notes, which they were positively instructed to negotiate at par. On several occasions even these were so long withheld, that the persons who had advanced materials and labour were importunate for payment, and silently discontented. To a certain extent the commissioners pledged their private credit. Notwithstanding all this, the men, at one time, actually broke off. The work was retarded, and her completion unavoidably deferred, to the great disappointment of the commissioners, until winter rendered it impossible for her to act.

Under all this pressure, they, nevertheless, persevered in the important object confided to them. But their exertions were further retarded by the premature and unexpected death of the engineer. The world was deprived of his invaluable labours before he had completed this favourite undertaking.—We will not inquire, wherefore,

in the dispensations of Divine Providence, he was not permitted to realize his grand conception. *His discoveries, however, survive for the benefit of mankind, and will extend to unborn generations.*

At length all matters were ready for a trial of the machinery to urge such a bulky vessel through the water. This essay was made on the first day of June, eighteen hundred and fifteen. She proved herself capable of opposing the wind, and of stemming the tide, of crossing currents, and of being steered among vessels riding at anchor, though the weather was boisterous and the water rough. Her performance demonstrated that the project was successful—no doubt remained that a floating battery, composed of heavy artillery, could be moved by steam. The commissioners returned from the exercise of the day, satisfied that the vessel would answer the intended purpose, and consoled themselves that their care had been bestowed upon a worthy object.

But it was discovered, that various alterations were necessary. Guided by the light of experience, they caused some errors to be corrected, and some defects to be supplied. She was prepared for a second voyage with all practicable speed.

On the fourth day of July she was again put in action. She performed a trip to the ocean, eastward of Sandy-Hook, and back again, a distance of fifty-three miles,

in eight hours and twenty minutes. A part of this time she had the tide against her, and had no assistance whatever from sails. Of the gentlemen who formed the company invited to witness the experiment, not one entertained a doubt of her fitness for the intended purpose.

Additional expedients were, notwithstanding, necessary to be sought for quickening and directing her motion. These were devised and executed with all possible care.

Suitable arrangements having been made, a third trial of her powers was attempted on the eleventh day of September, with the weight of twenty-six of her long and ponderous guns, and a considerable quantity of ammunition and stores on board; her draft of water was short of eleven feet. She changed her course by inverting the motion of the wheels, without the necessity of putting about. She fired salutes as she passed the forts, and she overcame the resistance of the wind and tide in her progress down the bay. She performed beautiful manœuvres around the United States' frigate Java, then at anchor near the light-house. She moved with remarkable celerity, and she was perfectly obedient to her double helm. It was observed that the explosion of powder produced very little concussion. The machinery was not affected by it in the smallest degree. Her progress, during the firing, was steady and uninter-

rupted. On the most accurate calculations, derived from heaving the log, her average velocity was five and a half miles per hour. Notwithstanding the resistance of currents, she was found to make head-way at the rate of two miles an hour against the ebb of the East River, running three and a half knots. The day's exercise was satisfactory to the respectable company who attended, beyond their utmost expectations. It was universally agreed that we now possessed a new auxiliary against every maritime invader. The city of New-York, exposed as it is, was considered as having the means of rendering itself invulnerable. The Delaware, the Chesapeake, Long-Island Sound, and every other bay and harbour in the nation, may be protected by the same tremendous power.

Among the inconveniences observable during the experiment, was the heat endured by the men who attended the fires. To enable a correct judgment to be formed on this point, one of the commissioners (Dr. Mitchill) descended and examined, by a thermometer, the temperature of the hold, between the two boilers. The quicksilver, exposed to the radiant heat of the burning fuel, rose to one hundred and sixteen degrees of Fahrenheit's scale. Though exposed thus to its intensity, he experienced no indisposition afterwards. The analogy of potteries, forges, glass-houses, kitchens, and other places, where labourers are habitually exposed to high heats, is

familiar to persons of business and of reflection. In all such occupations, the men, by proper relays, perform their services perfectly well.

The government, however, will understand that the hold of the present vessel could be rendered cooler by other apertures for the admission of air, and that on building another steam-frigate, the comfort of the firemen might be provided for, as in the ordinary steam-boats.

The commissioners congratulate the government and the nation on the event of this noble project. Honourable alike to its author and its patrons, it constitutes an era in warfare and the arts. The arrival of peace, indeed, has disappointed the expectations of conducting her to battle. That last and conclusive act of showing her superiority in combat, has not been in the power of the commissioners to make.

If a continuance of tranquillity should be our lot, and this steam vessel of war be not required for the public defence, the nation may rejoice that the fact we have ascertained is of incalculably greater value than the expenditure—and that if the present structure should perish, we have the information never to perish, how, on a future emergency, others may be built. The requisite variations will be dictated by circumstances.

Owing to the cessation of hostilities, it has been deemed inexpedient to finish and equip her as for immediate and active employ. In a few weeks every thing that is incomplete could receive the proper adjustment.

After so much has been done, and with such encouraging results, it becomes the commissioners to recommend that the steam-frigate be officered and manned for discipline and practice. A discreet commander, with a selected crew, could acquire experience in the mode of navigating this peculiar vessel. The supplies of fuel, the tending of the fire, the replenishing of the expended water, the management of the mechanism, the heating of shot, the exercise of the guns, and various other matters, can only become familiar by use. It is highly important that a portion of seamen and marines should be versed in the order and economy of the steam-frigate.—They will augment, diffuse, and perpetuate knowledge. When, in process of time, another war shall call for more structures of this kind, men, regularly trained to her tactics, may be despatched to the several stations where they may be wanted. If, on any such disposition, the government should desire a good and faithful agent, the commissioners recommend Captain Obed Smith to notice, as a person who has ably performed the duties of inspector from the beginning to the end of the concern.

Annexed to the report, you will find, sir, several statements explanatory of the subject. A separate report of

our colleague, the honourable Oliver Wolcott, whose removal from New-York precluded him from attending to the latter part of the business, with his accustomed zeal and fidelity, is herewith presented. A drawing of her form and appearance by Mr. Morgan, as being likely to give satisfaction to the department, is also subjoined, as are likewise an inventory of her furniture and effects, and an account of the timber and metals consolidated in her fabric.

It is hoped these communications will evince the pains taken by the commissioners to execute the honourable and responsible trust reposed in them by the government.

SAMUEL L. MITCHILL,
THOMAS MORRIS,
HENRY RUTGERS.

MEMOIR OF M. FREDERIC ROYOU,
Published in the Journal des Debats at Paris, 28th
March, 1816.

The wonderful navigation of M. Andriel, on board the steam-boat L'Elise, engages at present the public attention. It is one of the most happy applications which can be made of steam-engines:—a sublime invention, which procures to man an admirable and almost unlimited power. The first conception of this machine, is due

to the Marquis of Worcester, a projector, who published, in 1663, a work entitled a century of inventions. It is impossible to see a collection of ideas more original :— unhappily the greater part of them are impracticable. It was, however, from this work, that Savary or Savery, in 1696, took the idea of a steam-engine, which he brought to some degree of perfection ; but the essential improvements were suggested by Newcomen, in 1705 ; until which time this machine, since so important, was like Hercules in the cradle. Newcomen introduced the cylinder, in which the steam acts under a piston, and made the application of this moving power to a pump, by means of a great lever. H. Beighton, in 1717, made many interesting improvements ; but the theory of the steam engine, and its numerous applications, were reserved for M. Watt, of Glasgow, a man of transcendent genius. He proved that water converted into steam, under the ordinary pressure of the atmosphere, occupies a space about 1800 times greater than its volume in a liquid state. From 1765, the improvements made on Newcomen's machine by M. Watt, exceeded his hopes, and in 1781, he attained the summit of his glory, by discovering the means of producing a circular motion about a given axis. After the invention of the rotary machine, a new era for England commenced, and the manufacturing industry of that country raised it to a degree of splendour unknown in the history of the world. Among our neighbours, the steam engines are so multiplied, that they are easily procured, from a one horse power, not

consuming above a bushel of coal a-day to one, which equals the power of one hundred and twenty horses, and which burns eleven thousand pounds in twenty-four hours. Such is a brief history of a steam engine, which has given name to a boat, usually called Fulton's boat. In eighteen hundred and two, this great engineer constructed, at Paris, a steam-boat, which now draws upon him an attack rather rude, on the part of M. de Jouffroy, in an essay which he has just published. He calls Fulton a plagiarist, and pretends that this man, of so inventive a genius, has taken the idea of a steam-boat from him, in copying that which M. de Jouffroy constructed at Lyons, in one thousand seven hundred and eighty-two. I willingly applaud the patriotic sentiment by which M. de Jouffroy desired that the honour of so great an invention should be attributed to a Frenchman. Unhappily, however, it is here a question, much less of an invention, than of the application of a power already known. Besides Fulton has never claimed the merit of being the inventor in this sense. The application which he made, may be considered as ordinary and common in its nature, because it was pointed out by so many scientific men; but the means of application were necessary, and Fulton has procured them. The manner in which M. de Jouffroy moreover pretends to prove that Fulton has copied him, is very extraordinary. He gives the dimensions of his boat, and tells mechanics to compare them with Fulton's; but this comparison proves exactly the contrary of that which M. de Jouffroy wishes to es-

tablish. His boat, constructed at Lyons, was one hundred and thirty feet in length, by fourteen in breadth. That of Fulton, which navigates the North River, is one hundred and fifty-six feet in length, sixteen in breadth at the keel, and seven between decks. The boat of Fulton is then much larger than M. de Jouffroy's. Their forms besides are nothing alike, and the steam engines are placed in a different manner; but, again, this is not the question. M. de Jouffroy and Mr. Fulton have both applied to their boats the steam engine perfected by Watt. He, then, is the true inventor: for the rotary machine being known, who has not had the idea of applying it to boats? When gigantic projects caused so many flat boats to assemble at Bologne, I never heard M. de Jouffroy spoken of, and I often gave my opinion, that floating batteries propelled by steam engines should be preferred to all this flotilla. I was treated as a visionary; this is the custom in France; but, in short, if this project had been adopted, M. de Jouffroy would not have failed to cry out against the plagiarist. The frigate which Fulton constructed during the late war, was that also a plagiarism, because it was moved by a steam engine? But to conclude with M. de Jouffroy, I will observe, that from respect to the memory of Fulton, he should have at least combated him with the language of a mathematician, and not to say that the power of steam engines is estimated "at nine pounds for each round inch of the surface of the base of the cylinder." Geometricians measure surfaces by the square inch, and solids by the cubic

inch; the round inch is indeed the invention of M. de Jouffroy, and this invention, at least, no one will rob him of. He has also stated, in his pamphlet, some plausible reasons which, according to him, establish to a demonstration his right in the suit with which he seems to threaten M. Andriel; but this constructor, intrepid as he is modest, while M. de Jouffroy is writing against him at Paris, goes to England, embarks on board the boat *L'Elise*, and shows, for the first time, the steam engine struggling against a sea so boisterous, that an ordinary vessel would have been obliged to lay to. M. Andriel has replied victoriously to those persons who wished to confine the navigation of steam-boats to lakes and rivers. The remarks which he has made are not of a nature to stop intrepid navigators. If in the motion of *L'Elise* (which is called rolling), she has sometimes had one wheel out of the water, it will be easy to remedy this inconvenience, by constructing the wheels with moveable paddles, which may thus be lengthened or shortened at pleasure. The greatest difficulty to encounter will be the repugnance of sailors, when it will be proposed to them to enter vessels without masts, and consequently without sails. It will be necessary to begin by fixing a steam engine upon an ordinary vessel, and to make a trial in the bay of Brest. The sailors will be soon struck by the force of the moving power, which they will have at their control. The boat of Fulton goes from New-York to Albany in thirty-two hours,* running over, in that time, a distance of one

* They now go in eighteen hours.—Ed.

hundred and sixty miles, in spite of contrary winds and tides. The steam engine of this boat has a moving power equal to that of twenty horses. Commercial relations will derive an inconceivable extension by the introduction of steam-boats. The Seine, after some years, will be covered with boats of the greatest dimensions. The knowledge of navigation and of marine affairs will spread in Paris ; then scientific men will dissipate the prejudices so numerous in sea affairs, and drive them from the intrenchments they have formed by the aid of a language unknown to men of the world. This work will rapidly advance, when the period arrives that it shall be inculcated by considerations of interest.

FREDERIC ROYOU.

From the Evening Post.

MR. EDITOR,

The frequent accidents which have lately happened to steam-boats, are not only to be lamented on account of their fatal effects, but are much to be regretted, as they will tend to excite a want of confidence in a mode of conveyance, the safety of which was thought to be established by the experience of many years. Mr. Fulton commenced the navigation of the Hudson River by steam, in the spring of the year eighteen hundred and seven ; since which, fourteen steam-boats of large size have been built in this state under his directions or according to his plan ; most of these have been employed

as passage-boats, running from the city to various places, and no material accident has happened to any of them; much less has any thing occurred which could in the remotest degree endanger the passengers. The *Fulton*, which is the last boat that was built under the immediate superintendence of Mr. Fulton, has been running nearly three years, for the greatest part of the time, making in every week six trips, of nearly eighty odd miles each, always passing through Hell-gate, where she sometimes encounters an adverse tide, running at the rate of six miles an hour, and has often been exposed to the worst weather upon Long-Island Sound, which is from twelve to twenty miles wide, and where the sea raised by a storm, though not so high as it is in the ocean, is not less calculated to try a vessel. The *Fulton* has never made a harbour on account of the weather, excepting twice; yet she has never met with any accident worth mentioning, and though much money has been spent in attempts to improve her, it is believed that necessary repairs of what may be strictly called her machinery, have not cost twenty dollars. It would seem that the dreadful accidents which have lately happened to the steam-boats of the south, must have arisen from some defect in the construction of the machinery, or from carelessness or ignorance in its management, or perhaps from both. A desire to contrive something which may be so different from Mr. Fulton's invention, as to evade his patent, or an ambition to be esteemed inventors, has induced many to try projects without having capacity to calculate their

effects, and the difficulty of obtaining persons any wise acquainted with engines, has obliged the proprietors of steam-boats, often, to employ very inexperienced engineers. The accidents we have heard of have been occasioned, as we are told, by the bursting of the boilers, or by the boats taking fire. How the first accident *can* possibly happen to a well constructed boiler, it is not easy to conceive, or if it does happen, it is most extraordinary that it should be attended with such dreadful consequences.

Mr. Fulton adopted the principle of Mr. Watt, of England, in the construction of his boilers. These are adapted to bear, with perfect security, a pressure of eight pounds upon each square inch ; they will indeed support a great deal more ; but this being as much as is required, there is a contrivance called a safety-valve, by means of which, whenever the steam rises above the desired height, the extra pressure causes a valve to open, and by the discharge of the surplus steam through it, the boiler is relieved : unless by some egregious carelessness, this safety-valve is so obstructed as that it cannot open, or unless the boiler is so badly constructed as not to be capable of bearing the required pressure, it is impossible that it can burst. But there has been a great desire of late to lessen the expense of building steam-boats, and many have attempted to economise by lessening the cost of the boilers. In this they may have succeeded ; but it is to be feared that they have, at the same time, too much di-

minished their strength. We have heard that steam-boats have been built at the southward, which have cost under thirty thousand dollars. The Fulton's boiler alone cost, before it was moved from the shop of the constructor, near three and twenty thousand dollars. A project for employing what is called high steam, which although after repeated trials by the most ingenious and experienced men in England, it has long been abandoned there, seems to have been revived in this country, with great confidence in its superior advantages. Mr. Fulton, who knew well what experiments had been made on this subject in England, as well as in this country, often expressed his strong conviction, that it could neither safely or advantageously be applied to steam navigation. Whether all the boats which have met with accidents from the bursting of the boiler, employed high steam, we do not know; but one of them which was employed on the Mississippi, we have heard and believe, used high steam. It is much less surprising that such terrible accidents should sometimes happen with boilers of that description, than that they do not happen oftener. The high steam boiler is calculated to bear a pressure of from one hundred and fifty to two hundred pounds on the square inch. The high steam engine employed by Mr. Murray, in his paint manufactory in this city, cannot do her work without the pressure of one hundred and fifty pounds in the square inch. If we consider that this will give a pressure of more than twenty thousand weight upon every square foot of the copper of the boiler, we can well ima-

gine that there must be a dreadful explosion whenever the boiler gives way. With the other sort of boilers, no such dreadful consequences can follow from such an accident. It has often happened on account of the badness of the materials, or from the wear, or burning one of the coppers, after long usage; and when it does happen, the copper merely rips in the weakest part; the steam and water find vent through the rent, and the worst that can happen, is that the water may find its way to the bottom of the boat. But it is very different with the high steam boiler; in these, as the safety-valve does not rise till it feels so great a pressure, the boiler may burst at any thing below it, so that an explosion may take place when the steam is near the strength which the boiler is calculated to bear; and if it does, it is to be expected that the effect will be tremendous. As to fire, a well directed steam-boat is certainly less liable to this accident than a house. The fire of the Fulton boiler, for instance, from the mouth of the furnace, till it enters the chimney, is surrounded by water. The furnace and the flues are all in the centre of the body of water which fills the boiler, and unless the water in the boilers is suffered to fall below the flues, it is impossible that fire can be communicated to the boat; yet we have heard that one boat has been burnt by abominable carelessness, which is more inexcusable, because every well constructed boiler has guages, which enables the engineer to ascertain, precisely, how much water there is in it, and indeed every boiler will feed itself, and keep per-

fectly full, if the supply of water be not stopped off. As to fire being communicated by its falling from the door of the furnace into the bottom of the boat, there is certainly less danger of this, than there is of fire being communicated from a common hearth to a floor. The boat to a great distance in front of the furnace is covered with metallic plates; and if we consider, that whenever the fire is lighted, there is always several persons whose business is particularly to attend to it, that the navigation of the boat requires the watchful attention of several others, and the convenience with which water is always to be obtained, it cannot be believed that there is any danger from this source; besides, of late the boats have engines for throwing water to extinguish fires, which may be worked by the machinery or by hand.

If, sir, you think these observations will have a tendency to allay the apprehension which the distressing accounts that have given rise to them are likely to excite, by giving them a place in your paper, you will do a service to the public, and oblige

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MR. EDITOR,

Your attention to my communication of last evening, in relation to steam-boats, encourages me to hope that you may think a few further observations on the same subject will not be unacceptable. I am induced to wish to present some additional remarks to the public, in consequence of having read in your paper of this evening, an extract from the Charleston Courier of 17th September, giving some further particulars than we have yet had of the lamentable accident which lately happened to the Enterprise. It is very obvious, that even this account does not furnish us with such circumstantial information as will enable us to reason upon it with great confidence, and it may be thought that it would be better to wait for more satisfactory details, than to run the risk of committing errors by making wrong assumptions; but, in the mean time, the accounts which have been published, may fix a prejudice in the public mind, which it will be more difficult to remove hereafter than now, when interest and attention is awakened by the recent calamity.

As I have before mentioned, we do not know whether the boiler of the Enterprise was calculated for high steam, or if it was made on the principles adopted by Mr. Fulton. From the last Charleston account, there is great reason to think it was of the latter kind: for if it had been a high steam boiler, there is every reason to think the mischief would have been much greater. It

would appear that not the least injury was done to the hull of the boat ;—no persons suffered but those who “ had taken shelter, from the impending rain, below the deck, and close to the mouth of the boiler which burst ;” and so little force had the explosion, that “ a white man and two negroes who were employed below in attending the fires, all escaped without the least injury ; they were fortunately standing in the fore-castle, about *six feet from the mouth of the boiler*, which was separated from the body of the vessel by a board partition.” This slight obstruction then was sufficient to resist the shock of the explosion.

But, sir, I should not have desired again to invite public attention to this subject, had it not been that I might offer some considerations upon the suggestion which is made in the Charleston account, that this misfortune was the effect of lightning. When steam-boats first began to run, nothing was so much dreaded as that they would be extremely liable to this accident. It was thought that the great mass of metal composing their machinery would so much attract the electric fluid, that they would be a very dangerous mode of conveyance ; but many years experience seems to have allayed all extraordinary fears on that account, and it would be to be regretted if they were revived by any unfounded conjectures.

I cannot but think that the Charleston account, notwithstanding the pilot speaks of the lightning as an eye-

witness, shows that the accident cannot, from the nature of things, be justly imputed to this cause. We may question it with the less hesitation, as the account itself states, "that public opinion is much divided as to the cause of this awful accident."

It would have been satisfactory if we had been informed whether there was a thunder-storm at the time. If there had been, one would think, that so material a circumstance would not have escaped notice in the newspaper account. A single atmospheric electric discharge is certainly very uncommon. The water falling from the burst boiler on the fire in the furnace, would undoubtedly drive a vast body of ignited particles through the chimney, and the splendour of these in a dark evening, may have been mistaken by the pilot for the lightning, which he supposes he saw strike the top of the iron funnel.

But the course of the lightning and its effects, if they be truly described in the Charleston account, are irreconcilable with what we know of the nature of electric fluid. The lightning is said to have struck the top of the chimney, to have descended to the boiler, to have found vent by bursting the under part of it, and afterwards to have escaped out of one of the port-holes—and all this, as we are to suppose, without having left the least trace, except upon the chimney and boiler, of its progress: for if its course were marked by its effects, it certainly would have been mentioned. As to what hap-

pened to the chimney and boiler, it might, it is true, have been produced by lightning; but it might also have been caused by the bursting of the boiler. It seems to betray a very incorrect notion of the nature of electricity, to say that the electric fluid forced its way through the boiler, and burst it to find vent. This seems to consider the electric matter as having occupied the cavity of the boiler, and being there embodied as struggling to make an aperture which was necessary for its escape. And it seems not much less surprising to suppose, that the electric fluid, without availing itself of any conductor, passed from the boiler through a port-hole and was dissipated. It is not possible that this should have been the course of a stroke of lightning. The fluid would have followed some conductor, or have passed from one conducting body to another, and must have left its traces.

I would not insist that the *Enterprise* has not been struck with lightning; much less should I attempt to maintain that a steam-boat is not exposed to this accident. But, sir, I think it improbable that lightning was the cause of the misfortune in question, and I believe so far from a steam-boat being more liable than any other vessel to electric shocks, that she is less so; and this for the very reason that many suppose renders her the most obnoxious to this accident: that is to say, because she has in her so large a mass of iron or metal. Permit me to offer some few observations in support of a proposition, which I know is very contrary to general opinion,

but which I think may be maintained not only by reasoning, but is sanctioned by experience.

We know that the electric shock is occasioned by the passage of the electric fluid, from a body which is charged with a certain quantity of it, to a body which has less ; and when two bodies so circumstanced come within a certain distance, as much electric matter will pass from the one to the other, as to leave with each an equal quantity of electric fire. Thunder clouds are generally charged with a great superabundance of electricity, and will therefore discharge themselves when they feel the influence of bodies which have little electric matter about them. These bodies are on this account the most likely to be struck. Those bodies which commonly retain a certain quantity of electric matter, will be the least likely to feel the effects of lightning. Iron not only conducts, but attracts more powerfully than most other substances the electric fluid. A large body of iron will therefore generally have its due portion of electric matter, and on that account is less likely than other substances to invite a cloud to part with a portion of its electric fluid.

I should trespass too much on your indulgence, were I now to present all the arguments which I think may be offered in support of this theory. But let me direct your attention to some facts, which, as I have said, seem to give it the sanction of experience.

I never have heard of an iron store, a forge, or a furnace being struck by lightning. There are now, and have been for some years, forty or fifty steam-boats employed in the United States; and if the Enterprise has been struck, she is certainly the only one that has met with this accident. Several vessels have been struck in this harbour, and a number of houses in our city have been injured by lightning, while the steam-boats have been lying at our wharves. If steam-boats had been particularly attractive, it seems reasonable to suppose, that they would not so long and so generally have escaped.

The ridge of mountains which are intersected by the Hudson river, and which is spread over a considerable part of this state and New-Jersey, contains great quantities of iron ore. Since the ideas on this subject, which I now communicate, have been in my mind, I have made frequent inquiries of persons who inhabit, or are well acquainted with, these mountains; I never could find one who knew that lightning had ever taken effect on these elevations; but almost every one could recollect instances of trees, houses, or barns, having been struck in the valleys.

It may be also, and I think it not improbable, that the motion of the engine contributes to gather about it an electric atmosphere. If it do so, it is less attractive than even the same inert mass of iron would be.

It seems to be a solicism to say, that because iron is attractive of lightning, that it is not likely to be struck ; and it may occur to many, that the use of lightning rods are in opposition to this theory. I think it is not so. But it is impossible to discuss objections which may be suggested at this time.

If you think this communication will induce the public to suffer their reason rather than their fears to direct their judgment on this subject, you will, by giving it a place in your paper, again oblige a

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[The two preceding communications, we understand, were written by the author of the Life of Mr. Fulton.]

Ed.

The following observations on the bursting of a high steam boiler lately, in England, is taken from a London newspaper. The remark that no fatal accident of this nature happened for the forty years, during which the condensing engine has been in use, and not until these dangerous attempts have been made to use high steam, is well deserving notice:

STEAM ENGINES.

To the Editor of the London Morning Chronicle.

SIR,

In common with every friend of humanity, I regret the fatal catastrophe that occurred on Friday last, at Norwich, in the blowing up of one of the steam packets of that place. I am firmly persuaded that it will be found, that this has been occasioned by the introduction of what is termed the high pressure steam engine, which ought never to be employed in any situation, much less in a boat, where a supply of water for the working of an engine is always at hand; the want of such a supply of water being the only rational cause and apology for the employment of this very perilous engine. This cannot be urged for its erection in a boat. It has long been my decided opinion, that a legislative act should be made to prevent the use of high pressure steam engines, particularly on board of boats engaged in the conveyance of passengers. I understand that three of the members of the London Society of Practical Engineers have been deputed to Norwich, to collect all the facts

connected with this melancholy accident ; and I earnestly hope that the result of their inquiries will lead not only to a speedy application to parliament to adopt an adequate legislative measure, to prohibit altogether the use of high pressure steam engines on board of boats, but also to remove the fears of persons who are neither scientifically nor practically acquainted with the perfect safety and sufficiency of condensing steam engines for manufacturing and navigable purposes.

Although a friend to scientific and mechanical enterprise and improvement, yet I am persuaded that the welfare of the community demands that the erection of high pressure steam engines, and cast iron boilers of any kind, should be prohibited ; knowing, as I do, the tremendous danger and mischief that may result from their unskilful management. Indeed all the useful and mighty advantages resulting from the employment of steam engines can be securely and effectually accomplished by the condensing steam engine and its boiler made in pieces, and put together by rivets or other mechanical means.

If I may be allowed, sir, to use a metaphor on this serious subject, I consider that a high pressure steam engine, by negligence, or want of skill, becomes "an infernal machine," and may well be regarded as dangerous as a barrel of gunpowder in a smith's shop ; while a condensing steam engine, with its proper boiler, although

accompanied with inattention and ignorance, is as harmless as a snow-ball !

I sincerely trust, on the one hand, that no senseless or ill-founded fears will prompt the public to adopt prejudices against steam-boats, thereby to deprive the community of their great and increasing benefits, when they are provided with proper and efficient steam engines ; and, on the other hand, I hope that the proprietors of these vessels will, for their own interest and the welfare of the public, reject and discontinue the use of all hazardous steam engines, which upwards of forty years extensive experience have proved to be not only commensurate to every application of variety and power, but unattended either with apprehension or danger in their performances. I shall feel, sir, much obliged by your early insertion of this letter in your valuable and independent paper.

I am, sir, your's respectfully,

ALEX. GALLOWAY,

Machinist and Engineer,

69 High Holborn,

The following letter to Governor Mifflin from Mr. Fulton, is taken from his Treatise on Canal Navigation. The public attention is now so much directed to this subject, that it is thought a publication of this interesting document will not be unacceptable.

TO THOMAS MIFFLIN,

GOVERNOR OF THE COMMONWEALTH OF PENNSYLVANIA.

SIR,

During the prosecution of my experiments on canal operations, which are exhibited in the preceding treatise, I frequently contemplated their great importance to the states of America, and much wished to awaken the public mind to a full sense of the subject ; but, on considering the habits of the people of the interior country, accustomed only to land carriage, I feared much difficulty would arise in removing the prejudice in favour of waggoning, and in raising a sum of money adequate to the first expense of a canal of importance. In deliberating on the mode of surmounting these obstacles, I was so fortunate as to meet with your address to the House of Representatives, in 1795, and particularly happy to find your ideas, of the importance of easy communications between remote parts of the country, so consonant to my own, and at the same time so earnestly recommended to the public attention : which circumstance has urged me to address this chapter to you, convinced that your sense of the subject will not suffer any observations which may be useful to lie dormant.

I must therefore request you deliberately to peruse the system laid down, which you will find, by chapter VII. totally explodes the old practice, for two reasons : *First*, Because they may be constructed for half the sum necessary to a lock canal ; and, *Secondly*, Because on them you may perform despatch, and pass through the most mountainous country at the speed of six miles per hour ; an advantage which lock canals can never give, and which precludes an immensity of carriage : yet the small canal takes in every kind of conveyance, and performs the double office of a canal and road ; therefore, if founded and governed by sound principles, a mountainous country may have all the blessings of water conveyance, so celebrated in the level and fertile plains of Egypt. But how to extend these conveniences into every corner and district of America is now to be considered.

While the mind hovers over the immense continent of America, and views its vast interior, inhabited in various districts remote from the marts of trade, with infinite scenes for the improvement and nourishment of millions of human beings, philanthropy seeks to combine the exertions of the present inhabitants to facilitate their labour, extend their interests, invite population, and give a cultivating hand to every acre of that extensive territory.

To such a wish, in one point of view, is presented a great and fertile country, interspersed with luxuriant

vales and numerous mountains, nourishing infinite rivulets, which meandering the country, feed long and rugged rivers, diminishing to naked shoals in dry seasons, or swelling to roaring torrents in time of rain; pressing their way through stupendous cliffs and infinite rocks, present objects hostile to navigating the streams of nature.

But such are the materials which art must bring into unison; the performance of which is a subject the most benevolent and important, and worthy the serious contemplation of the penetrating members of society, as a great national question.

On this head it must be evident, that in proportion as produce is remote from market its value is diminished, in consequence of the expense of carriage, and hence remote parts are excluded the market, or a facility of exchanging their surplus produce for necessaries which they may require; thus the nerves of exertion are cramped, the faculties of body and mind are not called forth, and the country remains a dreary and inhospitable waste. But to encourage population and increase the value of the lands, the cheapest possible conveyance of the produce must be established on sound principles; for, exactly in proportion to the ease of reaching the market, the remote countries of equal fertility will be of more or less consequence in the scale of society; therefore, to sum up the idea, would not the lands about Fort-

Pitt be as valuable as those round Lancaster, if the produce could be brought to market for the same sum ; and would not population consequently be encouraged?

For this purpose, as I have the strongest conviction operating on my mind, that canals are the only effectual means of producing easy communications, and that they consequently are of the utmost importance ; I much wish that the public may be made thoroughly sensible of their utility, and that each state might establish a society to investigate the propriety of forming them in such districts as the present state of population and trade may most require them ; keeping one important object in view, that all future canals may be constructed on one scale and principle, in order that when the various branches meet the boats, one may navigate the other wherever canals extend. This you will observe has been my wish throughout, and in which I hope I have been so fortunate as to succeed ; if so, canals appear in a new light, and are still more important than formerly, because they may now be fitted to every kind of country, and by their cheapness approach near to the expense of constructing turnpike roads.

At a period when a country is improving by turnpike roads, the question is, whether it is not best to adopt canals ; and the criterion to judge of the propriety of the canal, will depend on simple calculation, to the following effect : 1st, what is the expense of the road ; 2d,

what is the expense of the canal ; 3d, what is the expense of carriage by the road ; 4th, what is the expense of carriage by the canal ; and probably it will be found the canal will perform the work so cheap, as to justify three or four times the sum being expended in the canal, that would be necessary to constructing a road of the same length ; to which one consideration must be added in favour of the canal, viz. On all roads, however good, the great expense of carriage is the number of horses ; but on canals, the principal expense is the tonnage or tolls to the proprietors, as interest for the money advanced in forming the canal : yet this tonnage by a judicious arrangement may be reduced, *if not liquidated*, and the carriage on a canal may be so regulated, that goods conveyed four hundred or more miles, will not cost more than those which are navigated eighty or one hundred miles ; yet the eighty or one hundred miles canal conveyance will not cost half the sum necessary to land carriage, on the best of roads.

To elucidate this, I will suppose a canal from Philadelphia to Fort-Pitt, or any other long line, to say, three hundred and fifty miles ; on such a canal a man, boy, and horse, would convey forty tons twenty miles per day, and arrive at Philadelphia in (*say*) eighteen days, at 10*s.* per day, amounting to 180 shillings for forty tons, or 4*s.* 6*d.* per ton, the expense of boating, independent of tolls. By a road of the same length, four horses, perhaps five, would set out with not more than two tons, and,

travelling at the rate of twenty-five miles per day, arrive at Philadelphia in fourteen days; and to say only two dollars, or 15s. per day, amounting to 210 shillings, or 5l. 5s. per ton for waggoning, independent of turnpike. This, I hope, will exhibit the immense disparity between the two modes, and show that roads, however good, can never effectually relieve a remote country. The question then is, how to construct a canal in order to reduce the tolls, and completely assist the distant districts; this I conceive will totally depend on the mode of raising and appropriating a sum of money to the first fifty or one hundred miles of canal,

In this country, canals are paid by companies of subscribers, who receive a toll on the carriage of goods as an interest for the money advanced, and the immense quantity of carriage throughout every part of this compact kingdom, usually produces a considerable interest for the money expended, while the expense of carriage is reduced below that of land conveyance; but as England is environed with water, with numerous sea-ports, there is no part very remote from the market, and hence, they never will have canals of any comparative length with those necessary in America, to say seven or eight hundred miles; therefore the mode of proprietors receiving tonnage at so much per mile, although it will ever be much below land-carriage, yet even that tonnage would preclude the market from the remote country, and by no means answer for American canals: for instance,

		£.	s.	d.
A constructs a canal fifty miles long, and receives two-pence per ton per mile		0	8	4
B ditto - - - - -		0	8	4
K ditto - - - - -		0	8	4
D ditto - - - - -		0	8	4
E ditto - - - - -		0	8	4
F ditto - - - - -		0	8	4
G ditto - - - - -		0	8	4

350 miles £ 2 18 4 per ton,
 tolls, independent of boating ; and hence I conceive the
 produce could not bear the expense of carriage by this
 method.

But as it is the produce of the interior country which
 must be drawn forth, the leading canals should be na-
 tional works, perhaps by the following system.

First, That the legislature, by such duties or imposts
 as they conceive most eligible, raise a sum of money
 adequate to the expense of the first sixty or seventy
 miles of a canal ; to say from Philadelphia to Lancaster,
 which perhaps may cost 150,000*l.* of which 30,000*l.*
 per annum, may be required till the canal is finished.
 On this canal, sixty miles long, if I suppose fifty tons
 per day to be navigated at two-pence per ton per mile,
 allowing two hundred and eighty working days per year,
 it would amount to 7,000*l.* per annum, which should be ap-

plied to extending the canal; the tolls on such extension being appropriated in like manner to further extension, and so on, the toll to be continually devoted to forming more canal; till canals would pervade the whole country by virtue of their own produce arising from the tolls.

If this mode of extending the canal, by appropriating the tolls, should be deemed too tedious for the speedy relief to the interior country, and the funds of the state would admit of the advance of a further sum, they might immediately extend the canal two hundred miles, and receive the tolls, till the last advanced sum was liquidated; or, as the proprietors of the lands in the interior would be much benefited by their property being raised in value, probably they might raise the sum, and receive the tolls till such sum was liquidated: the lands being increased in value, might be deemed sufficient interest till the principal was discharged, which would diminish every year.

If by either of these modes, or any better which can be devised, I suppose the first two hundred miles of canal to be formed, the trade will be more in proportion to the length than on the first sixty miles before estimated; because, being more remote from the metropolis, the interior inhabitants will be necessitated to fly to the canal, the tonnage will also be greater; therefore, if I allow on the two hundred miles one hundred tons per day, to be navigated at twenty shillings per ton for the whole

length, or in proportion for a shorter distance, the annual produce would be 28,000*l.*; and having arrived at such annual income, canals would proceed with despatch, and progressively increase, both in riches and extension; each year the produce of tonnage would increase, and each year a greater length of canal might be constructed.

Therefore, if I proceed with this progressive and creative system, till a canal reached Fort-Pitt, which, with some bends, I will call three hundred and sixty miles; the country, which such canal would accommodate, would widen as it was more remote from Philadelphia. For instance, the man who lived twenty miles from Philadelphia, might convey his goods seven to the canal; the man at forty miles distance might go fourteen or fifteen to the canal; at sixty miles, twenty to the canal; and so on, till at the extremity of three hundred and sixty miles, they probably would go fifty on each side to the canal; hence, if I average the whole, such canal may be said to accommodate a country three hundred and sixty miles long, fifty miles wide; on which the tonnage must now be regulated.

The man who resides twenty miles from Philadelphia, and seven from the canal, should he convey a ton of goods by land, it would be worth at least fifteen shillings, as it would employ a man and two horses two days.*

* The English reader, who may look over this chapter, may perhaps be surprised at stating the land-carriage of America so low. But as I do not

The carriage to the canal, seven miles in	s.
like proportion, - - - - -	5
Carriage on the canal, - - - - -	4
Total,	9

Thus the saving would be six shillings, and the tonnage should increase to a certain sum on the first hundred miles of canal, keeping much within the limits of land-carriage; then decrease as the boating increased, in order to draw the trade of the back country into the canal.

The expense of boating a ton twenty miles will be as follows: a man, boy, and horse, will convey forty tons twenty miles for ten shillings, which is three-pence per ton for twenty miles; but to allow contingencies, say four-pence per ton, for boating twenty miles; the tonnage and boating on the three hundred and sixty miles should then be regulated, perhaps, in the following order:

MILES.	TONNAGE.		BOATING.		AMOUNT.	
	s.	d.	s.	d.	s.	d.
20	4	0	0	4	4	4
40	8	0	0	8	8	8

know the average expense of that country, I estimate it low in order to give it every advantage, in a comparative view with the canal. In England, it would cost at least one guinea, with all the advantage of good turnpike roads.

MILES.	TONNAGE.		BOATING.		AMOUNT.	
	s.	d.	s.	d.	s.	d.
60	12	0	1	0	13	0
80	16	0	1	4	17	4
* 100	20	0	1	8	21	8
120	19	8	2	0	21	8
140	19	4	2	4	21	8
160	19	0	2	8	21	8
180	18	8	3	0	21	8
200	18	4	3	4	21	8
220	18	0	3	8	21	8
240	17	8	4	0	21	8
260	17	4	4	4	21	8
280	17	0	4	8	21	8
300	16	8	5	0	21	8
320	16	4	5	4	21	8
340	16	0	5	8	21	8
† 360	15	8	6	0	21	8

By this system, the country at the extremity of three hundred and sixty miles, would deliver goods at Philadelphia for twenty-one shillings and eight-pence; which is the same as paid at the distance of one hundred miles; to which the land-carriage to the canal must be added. But as such a system would open a market to the remote

* This being within the limits of land-carriage, the tonnage must now begin to decrease as the boating is increased.

† If the boats return without back-carriage, the expense of boating, which on the three hundred and sixty miles is six shillings, must be deducted from the tolls; and in proportion on the various parts of the canal.

country, every acre of ground within reach of the canal would become more valuable, and the carriage to the canal must be borne for some years. But as population increased, and the tonnage on the main line became productive, lateral branches would be cut from the canal, and thus further improve the country; the tonnage on such branches being proportioned as before stated, according to the distance from the city.

The carriage on such canal would consequently be immense; for, as I before stated, it would accommodate a country three hundred and sixty miles long, fifty miles wide, in the main, containing eighteen thousand square miles, or eleven million five hundred and twenty thousand acres. If, by further improvement, I allow that only every fiftieth acre will produce one ton of carriage per annum, the amount would be two hundred and thirty thousand four hundred tons; which appears, by averaging the preceding tonnage, would cost fifteen shillings per ton, in tolls to the canal, amounting to 172,800*l.* per annum, in order to construct further canal; a sum adequate to forming, perhaps, eighty or one hundred miles per year: having arrived at such a length, it is evident canals would increase with astonishing rapidity, and produce conveniences, even beyond the limits of calculation; for it must be observed, and strictly adhered to, that by canals you may equalize the carriage of the near and remote country, as before exhibited by the mode of regulating the boating with the tonnage, in proportion to

the extent; inasmuch as that a ton of goods may be carried three hundred and sixty miles for 1*l.* 1*s.* 8*d.* Yet, was I to extend the idea to a still more distant district, by reducing the tonnage as the boating increased, till the tolls were annihilated, and the boating amounted to 1*l.* 1*s.* 8*d.*; a ton of goods might be boated thirteen hundred miles for that sum; yet a ton could not be waggoned the same distance for less than 38*l.* 10*s.* so great is the disparity between land and water-carriage.

Hence it must be evident, that roads, however good, can never effectually assist the remote country; each mile is attended with a heavy expense on carriage, till penetrating so far, that the value of the produce is consumed in carriage; it terminates in a luxuriant wilderness, sable and uncultivated as the interior of Africa. But by canals, the conveyance may be so easy, that they may penetrate the most remote districts, draw down the produce to the ports of trade, and bear up the various conveniences of life; thus each man may exchange his surplus labour for the necessities or luxuries which he may require; hence his faculties will be put into action, cultivation will flourish, and enjoyment be more equally diffused; canals will pass through every vale, meander round each hill, and bind the whole country in the bonds of social intercourse; hence population will be increased, each acre of land will become valuable, industry will be stimulated, and the nation, gaining strength, will rise to unparalleled importance, by virtue of so powerful an ally as canals.

Having exhibited the immense disparity between canals and roads, with the mode of extending canals in every direction, by appropriating the tolls ; it is evident, that such a system will produce infinite navigation. But the mode of constructing them must be maturely considered ; and in this, two things must be scrupulously adhered to.

First, that canals may truly benefit a country, it is necessary the passage should be performed with equal ease each way. Second, that the nearest course should be taken to the principal points of the country ; and for both these reasons, the beds of the rivers, beyond tide, must almost universally be forsaken ;* because torrents, in time of rain, which is extremely injurious to the works of art, with the shoals in dry seasons, together with the current ever standing one way, will very frequently interrupt free intercourse, and render fresh-water river navigations precarious.

The rivers, creeks, and rivulets, which are numerous in all parts, must be considered as the feeders of canals ; and, in this respect, having an abundance of water, America is very fortunate ; land is also cheap and timber

* By forsaking the beds of the rivers I mean, that they should not compose or make a principal part of a leading canal ; yet, however numerous canals may be, it will frequently happen that some miles of a river will afford easy navigation in particular seasons, and probably touch the leading canals into which the goods, or perhaps boats, may be transferred from the river ; for small boats will live on the American rivers in particular parts and seasons, of which there are innumerable instances by the batteaux and even canoes.

plenty, so that the great expense of an American canal would be labour.

Therefore, as it is the channels of art which can only effectually assist the country, I have constantly endeavoured to find a system which might pass by the straightest line to a given point; hence you will observe the mode of mounting hills, crossing valleys, rivers, and defiles, by the various machines; which, I hope, will display an easy means of extending water communications through a great continent, and bear the mind to those days, when a well-directed economy in manual labour will give enlightened and rational enjoyment to many millions of inhabitants: hoping, that this important subject will make a part of the deliberation of a wise legislature.

I remain, with all possible respect,

Your's sincerely,

ROBERT FULTON.

London, March, 1796.

The following letter from Mr. Fulton to the Secretary of the Navy, accompanied the Report of the Commissioners appointed by the Government to superintend the experiments made in eighteen hundred and eleven, on submarine warfare.

KALORAMA, (*District of Columbia,*)

FEBRUARY 1, 1811.

SIR,

I have the honour to return to you the report of the committee on the torpedo experiments, with that of Commodore Rodgers; and the letters of Robert R. Livingston, Morgan Lewis, and Cadwallader D. Colden, on the same subject. The opinions expressed in these papers are, I think, as favourable to this infant art, as under all circumstances could be expected.

It is proved and admitted—

1st. That the water-proof locks will ignite gunpowder under water.

2d. It is proved that seventy pounds of powder exploded under the bottom of a vessel of two hundred tons, will blow her up; hence it is admitted by all the above parties, that if a sufficient quantity of powder (and which I believe need not be more than two hundred pounds) be ignited under the bottom of a first rate man of war, it would instantly destroy her.

3d. It is proved and admitted by all parties concerned in the experiments, that a gun can be fired under water, and a cable of any size may be cut by that means at any required depth.

With these immensely important principles proved and admitted, the question naturally occurs, whether there be within the genius or inventive faculties of man, the means of placing a torpedo under a ship, in defiance of her powers of resistance. He who says there is not, and that consequently torpedoes never can be rendered useful, must of course believe that he has penetrated to the limits of man's inventive powers, and that he has contemplated all the combinations and arrangements which present or future ingenuity can devise to place a torpedo under a ship.

There is no man of sound sense, who has the least acquaintance with the difficulties under which all the arts have laboured in their infancy, who on calm reflection will be so weak or vain as to presume that he possesses a strength of intellect to foresee all that can be done, not only in infant arts, but in arts now familiar and long established.

But as it is impossible now to conceive the various modes which may be invented for placing torpedoes under a ship, and as the success is of incalculable importance to our country, there is every reason to prosecute

the experiments with ardour; and we are encouraged to this by a contemplation of the progress of the whole military art, and particularly the attack and defence of fortified places. The celebrated Vauban, after years of experience, aided by a powerful genius, to fortify cities, confessed that it was impossible to make any work so strong by art alone that it could not be taken by the art and exertions of a besieging army, in which the besiegers commence by parallels and zig zags, to approach the rampart of the besieged, and run their mine or subterranean passage under the works to blow them up. During the whole time of their approaches, which is frequently for weeks or months, the besiegers are under as heavy a fire from the besieged, as has or perhaps can be invented; when the explosion makes a breach in the rampart it is defended by all the guns loaded with grape and canister shot, which can be brought to bear upon it: the trench is enfiladed with cannon and small arms. In fact the whole power of the besieged is directed to defend the breach, perhaps not twenty feet wide; yet in defiance of so concentrated a fire, a fire infinitely more destructive than any ship could keep up from her bow, there are hundreds of instances of such breaches having been forced and the works taken. Is it impossible to contemplate the ingenious combinations, the perseverance, the risk and acts of valour of a besieging army, and then believe that there are not ways and means, enterprise and courage, when organized and exercised, to mine through water, which is the work of a few minutes, and blow up a

ship, when the risk is not one thousandth part so great as that of storming a breach? I think, sir, this comparative view of the danger in storming a breach, and attacking a ship, proves, that added to three principles beforementioned and admitted, the courage to undertake the attack of a ship with torpedoes must be admitted also.

I will now consider the progress of the experiments at New-York, and the prospect of future improvement which they present :

First, as to the harpoon, it is admitted that at the distance of "*fifteen feet the harpoon stuck firm.*"* Were it improved it should not be fired at a greater distance from the ship than thirty or forty feet, because the sudden jerk on the line might break it off at the torpedo : men in a boat at thirty feet distance from a ship, are in as great danger as when in with her bow and under her guns ; thus as the harpoon can be fixed at fifteen feet, I will not at present insist on a greater distance, though I am certain that practice will enable me to fix the harpoons at the distance of forty or more feet if required ; but I do insist that organized men, who have courage to storm a breach or to attack a vessel by boarding, have courage to approach within fifteen feet of a ship to fire a harpoon, or even if necessary to drive a spike into her bow ; when the ship discharges her bow guns, her bow must be covered with smoke, after which all shot against

* It entered five inches into oak plank.

the boats will be random, particularly if the attack be made in the night ; but to protect the men, the torpedo boats may be decked with thick oak plank, and rendered proof against canister and musket-shot. The risk of the men would then be inconsiderable, for while a boat was near in with the bow of the ship, her cannon could not be brought to bear so as to fire round shot. It is, therefore, a fair conclusion, that, courage added to art, a ship cannot guard herself against a torpedo attack by means of her guns and small arms only. She must, therefore, have nets, booms, grapples, &c. &c.

I will now do justice to the talents of commodore Rodgers, by stating that the nets, booms, kentledge and grapnels which he arranged round the *Argus*, made at first sight a formidable appearance against *one torpedo boat and eight bad oarsmen*. I was taken unawares ; I had explained to the officers of the navy my means of attack ; they did not inform me of their measures of defence ; the nets were put down to the ground, otherwise I should have sent the torpedoes under them. In this situation, the means with which I was provided, being imperfect, insignificant and inadequate to the effect to be produced, I might be compared to what Bartholomew Schwartz, the inventor of gunpowder, would have appeared, had he lived at the time of *Julius Caesar*, and presented himself before the gates of Rome with a four-pounder, thereby endeavouring to convince the Roman legions that by the means of such machines well or-

ganized, he could batter down the walls and take the city : a few catapultas casting arrows and stones upon his men, would have caused them to retreat ; a shower of rain might destroy his ill-guarded powder, and the Roman centurions who could not conceive the various modes in which gunpowder has since been used to destroy the then art of war, (as my opponents cannot now see the combinations by which torpedoes may supersede the necessity of ships of war) would very naturally conclude that it was a useless invention ; while the manufacturers of catapultas, bows, arrows and shields, would be the most vehement against further experiments.

This, sir, may be conceived a digression ; but being on an interesting subject, I have stated this supposed first experiment with a four-pounder as a case in point. Some of the first cannon were made of leather ; but if such cannon failed, does it therefore follow that gunpowder was useless ? Or does it follow, because I was not prepared to put torpedoes through a net the first time it was presented to me, that the defect was in the torpedoes ? You, sir, will instantly perceive it was not ; but arose from the want of time and experience. I had not one man instructed in the use of the machines, nor had I time to reflect on this particular mode for defending a vessel. I have now, however, had time ; and I feel confident that I have discovered a means which will render nets to the ground, booms, kentledge, grapnels, oars with

sword-blades through the port-holes, and all such kinds of operations, totally useless.

It is as follows :—

Should an enemy of any force enter one of our ports and put her nets to the ground, let government press from the wharves four or more merchantmen, loaded or in ballast, each of them from three to four hundred tons burden; in the magazine there should be thirty or forty torpedoes, each containing two hundred pounds of powder, and each adjusted to the end of a spar or boom, from 40 to 60 feet long, tapering from the butt to the point, where the torpedo, of a conic form, and having on each side a long blade or scythe, should be firmly fixed; let the butt end of the spar be tied so as to act like a swivel under the fore-chains, one on the larboard, the other on the starboard side, and the other end of the spars with the torpedo be hoisted up to the spritsail-yard, and held there until near the scene of action. The expense of thus preparing a ship will be 800 or 1,000 dollars, and each will be as dangerous to an enemy as a fire-ship. The expense of a fire-ship is from 8 to 10,000 dollars, which sum could certainly be expended to greater advantage by arranging torpedo-ships as here proposed, and for the following reasons :—First, 8,000 dollars would pay for arranging eight torpedo-ships, which could be done in a few hours; each with two tor-

pedoes projecting from the bow, which eight ships moving at one time towards the enemy, would divide her fire on eight points, and render it less dangerous to each, than in the case of one fire-ship, which would draw on her the whole fire of the vessel attacked.

Second, the expense of a fire-ship is so great, that an attack is seldom made with more than one, which must be grappled with the enemy; then set on fire and abandoned by her men, who must take to their boat, and expose themselves to the boats and guns of the vessel attacked. Should the fire-ship be grappled to the enemy, still she may not burn so as to communicate the fire: or if to the leeward, she may be cut adrift; at all events, if in port, the men could escape to the shore: therefore, their danger not being great, they would work with more confidence and ardour to extinguish the flames and save their ship; yet the danger with which fire-ships impress an enemy makes them respect the ports where they are prepared for action.

In the year 1776, Commodore Tolbert grappled a fire-ship to a British two-decker in the river Hudson: he set his ship on fire and returned to shore under a heavy discharge of musketry and cannon without losing a man. He failed to burn the enemy, but he drove the vessel attacked and one of equal force, from seven miles above

New-York, down to Staten-Island. The following note is his account of this enterprise.*

As it does not require so much bravery to make an attack with a torpedo-ship, as to grapple a fire-ship to an enemy, the use of fire-ships proves that courage is to be found to attack with those which may be armed with torpedoes.

Suppose then two torpedo-ships fastened to each other by a chain 80 or 100 feet long, forming a bridle opposite to the fore chains, in the manner I arrange my floating torpedoes; then to be sailed or floated down on the tide,

* In the year 1776, I was captain in the service of the United States, and at the same time attached to General Green's brigade then stationed on Long-Island. At this time General Washington sent for me, requesting that I would take command of a *brig* which was prepared as a fire-ship or vessel. I consented, and in the latter part of the year, lying in the river Hudson, nearly opposite the small river which separates the island of New-York from the main land, I took advantage of a fair wind, ran down the river to two British ships of war which lay at anchor about seven miles above New-York, and grappled a two-decker, and perhaps, strange to say, I lay under her side until I got out of the water where I was forced by the violence of the fire; after which I took up a brave man by the name of Priestly, who was also forced into the river by the flame; myself and all my men escaped in my boat to the Jersey shore, under a fire from the broadside and musketry of the ship not grappled, without the loss of a life. I was, however, so much burnt, that I could not see the light for twenty days. This enterprise took place about four o'clock in the morning, and the battle of Haerlem, on York Island, commenced at daylight; on which occasion the American arms were probably much aided by the attack with this one fire-ship, for I drove every ship of war out of the Hudson river down to the watering place at Staten-Island, and cleared the river for some time, of ships of war, which it was evident were sent up the river to cover the left wing of the British army.

October 15, 1810.

SILAS TOLBERT.

the torpedoes let down 22 feet under water, one ship steered for the larboard and one for the starboard side of the enemy ; in this manner the chain would cross her cable, before which she must either slip or cut cable and run, or the momentum of the torpedo-ships would sheer round, stern outwards, and press the torpedoes through the nets under her bottom, where instant explosion would be instant death : such an operation gives no time for an enemy to deliberate or exert themselves to push off, or cut torpedo vessels adrift, or to calculate on getting to shore in boats. The tremendous consequence of explosion under a ship deprives common men, such as sailors, of all firmness, and the irresistible danger would also influence the major part of officers : hence this mode of attack is infinitely more to be dreaded than that of fire-ships ; and for these reasons an enemy will not dare to enter our ports to put it to the test. Should any one doubt the practicability of this mode of passing torpedoes through nets and under a vessel, the importance of the object merits the experiment. I therefore conceive it useless at this time to say more on the theory.*

* Mr. Colden has very properly remarked, "that if an enemy be driven to the necessity to protect herself with nets from above her water-line, to the bottom of the water in which she may be anchored, and which will sometimes be fifty or more feet deep : if she must place round her, booms, spars, kentledge, and grapnels, and thus trammel herself so as to be unfit for active service, that alone is a sufficient reason for adopting torpedoes." But on the plan I now propose, to break through nets with merchant ships armed with torpedoes, I will venture to predict that I will compel the vessel attacked to be so much embarrassed by nets, booms or spars to fend off, as to make her totally unfit for action ; or I will blow her up ; or should I fail to blow her up, I will prove that I can cut her cables

Of the *anchored torpedoes*, I have had the pleasure to show you the improvements I have made on these since the meeting of the committee at New-York, to give them stability under water, or to take them up or put them down when necessary: there is a very simple mode to convince any unbeliever of the advantage which this kind of engine will present, and the respect for our harbours which it will create in the mind of an enemy: let me put one under water, and they who do not believe in its effect may put their confidence to the proof by sailing over it.

A compound engine of this kind will cost from 800 to 1,000 dollars: 320 of them could be made for the first cost of one ship of 54 guns; of which 320, say 100 at New-York; 100, if required, at Boston; 100 at Charleston; 20 in the Delaware, to be placed in the waters between the forts or batteries; and thus four ports could be guarded so as to render it impossible for the enemy's ships to enter either of them, unless they had strength first to take possession of the land and forts, and then time to deliberately search for the torpedoes; yet one ship of 54 guns cannot guard one port against one 74 gun-ship, although her first cost in anchored torpedoes would guard at least three ports against 10 ships of 74 guns. In this estimate it may also be stated that a 54

or chains and set her adrift, with all her incumbrance of nets to the bottom, booms, spars, &c. &c. with which she must either be driven on shore or go to sea.

gun-ship in commission, costs the nation one hundred thousand dollars a-year; this at five per cent. is interest to raise a loan of two millions to build the forts or batteries in barbet, between which the torpedoes should be placed. While I thus compare the expense of torpedoes with that of a ship of 54 guns, I do not mean to object to such ships to protect our coast; but when considered for harbour defence, or aiding forts or batteries to defend harbours, the money can be better expended in torpedoes.

In the report of the committee it is also admitted that I cut a fourteen inch cable at the depth of six feet under water, (*it was in fact twelve feet under the water.*) In this experiment, it is true, I was five or six minutes within pistol-shot of the vessel: the reason is, it was only the fourth time a cable-cutting machine was ever tried; with so little experience I did not attempt to cut at a greater distance: the object at the time being to prove that a cable could be hooked and cut without injuring the machine. New invented instruments must be unskillfully used for a time, but with the practice of only one month and one good boat's crew, I will undertake to cut the cable of a ship at any given depth under water, without approaching nearer to her than eight hundred yards. I will also undertake to place myself at the distance of eight hundred yards from a ship having an unguarded cable, and at that distance I will put an improved cable-cutting machine in the water: I will there abandon it, and

it shall go to the cable, cut it off and set the ship adrift, without any further aid on my part than placing it in the *water*. Such is the unforeseen and incalculable results of mechanical combinations.* It may be said, if one cable be cut and anchor lost, the enemy could put out a second, third, fourth, or fifth anchor and cable; but as a provident government would not undertake to defend a port with one cannon, so there should be in the magazine fifteen or twenty machines for cutting cables, and there should be a marine militia practised in the use of them. In such case an enemy could not afford to exchange an anchor and cable worth 5000 dollars, against three ounces of gunpowder, and at the same time run the risk of being driven on shore in a calm or by a lee-tide; hence in our calculations on harbour defence this instrument alone will always be an embarrassing consideration for an enemy.

It must be admitted that the whole of the experiments at New-York were badly executed; but they could not be otherwise. I had not a man practised, nor am I experienced in the use of my own machines. I consequently was necessitated to explain my theory by such imperfect means as I had in my power; yet under all these disadvantages, I have to my satisfaction gained much useful experience, and evidently convinced some of the committee of the great importance of persevering, and particularly with a view to harbour defence. By the experi-

* This discovery has been produced by my other experiments.

ments I have discovered much of the strength and resources of my opponents ; and I am satisfied I can defeat every obstruction which has hitherto been presented : this I hope to prove after some practice. But having witnessed the activity and resources of mind which Commodore Rodgers and Captain Chauncey possess, I look forward to contend with new and difficult combinations which they may produce for defence : In this manner it is probable we shall discover the principal means of defence against torpedoes, and modes of attack with them, until like the attack and defence of fortified places, the measures to be pursued on each side, in all cases will become familiar, and a fair calculation may be made on the mode of attacking a ship.

But, sir, to do this, it is indispensable that I should have twenty or thirty men under my command to be practised to the use of my engines in my own way. Well as gunnery is understood, no one can hope that young recruits should fire a cannon with skill and effect until they have some months practice. It is, therefore, demanding of me to perform a miracle, to apply torpedoes to advantage, break through nets, harpoon ships and cut cables with an outfit of one thousand dollars, and not one man practised to assist me. Compare my situation with that of my opponents ; men of talents and sound nautical knowledge, working on their own element, the commodore commanding more than four hundred men in a ship of fifty-four guns, which ship, with all her various

apparatus as fitted for efficient service, is an engine produced by the combined talents of some thousands of ingenious men, who have directed their attention to the improvement of vessels of war since the invention of gunpowder: thus the commodore, added to his own talents, has the advantage of the experience and talents of all nautical men who have lived before him; yet he would not be so imprudent as to face an enemy of equal force, if his men were raw recruits unpractised to the guns or working of the ship; and it is to familiarize his men to their duty in each department that he is in a state of constant practice. A succession of experiments on his men, which costs the nation one hundred thousand dollars a-year, which experiments when followed from one to ten or twenty years at the expense of from one hundred thousand to two millions of dollars, is to enable him to do no more than fight one ship of equal force, in which contest the chances would be equal that he would not take or destroy the enemy: with all this expensive experiment for years of peace to be prepared in case of war, it is not expected that he should contend with a ship of seventy-four guns. But if experiments, which are inconsiderable in their expense compared to that of a fifty-four gun-ship, should prove that attacks with torpedoes can be rendered practicable and efficient (*and every reflection teaches me that they can*) it will be immaterial whether the enemy's vessel be forty or an eighty gun-ship, two hundred pounds of powder exploded under the bottom of *either* will produce certain destruction.

Thus, sir, considering this subject in these various points of view, its infancy, its prospect of success, and if successful its immense importance to these states, and to mankind, the small establishment, and inconsiderable sum required to practise and prove its utility, compared with the expense of other nautical establishments which promise only common and imperfect results, I conceive it highly merits a patient and candid succession of experiments; for which purpose I feel the necessity of taking time, that I may have the ensuing summer to practise a few men on nets, and such other obstructions as may be presented; which I hope, sir, will meet with your approbation and that of every friend to science.

I unite with the committee in opinion that government should not rely on this, or any new invention for defence, until its utility be fully proved. It never has been my wish that such confidence should be placed in torpedoes, until fair experiment had proved their value beyond a doubt.

I have the honour to be, sir,

With great respect,

Your most obedient,

ROBERT FULTON.

The honourable Paul Hamilton,

Secretary of the Navy.

AN ESSAY

*To point out the Means of preventing the Rupture of Boilers on board of Steam-Boats. By R. Hare, Jr. &c.**

The accidents which have, in several instances, arisen from the bursting of steam engine boilers, may, perhaps, create a prejudice against steam-boats; whereas it ought only to awaken attention to the mismanagement, which is solely the cause. An engine on Bolton and Watt's construction may, with no more pressure than that of a boiling tea-kettle, lift, at each stroke, a column of water, equal, in diameter, to the cylinder, and more than twenty-five feet high. Every additional pound per square inch on the safety-valve, (the steam being raised proportionally,) will add two feet nearly, in height, to the column of water, thus representing the power of the engine. As this is not probably attended by a proportional consumption of fuel, and adds to the power, without increasing the size, of the apparatus, there is strong temptation for using high steam: but, from what we have said above, respecting the power of an engine, when working without pressure, but merely by the effects of condensation, there is evidently no necessity and no excuse for doing so. As a practical proof, that high pressure may be avoided, without material inconvenience, we state, that, in the Fulton or New-Haven steam-boat, the speed of which has been equalled in two instances only, the ratio between the boiler and cylinder has been such as not to admit

* From the *Analectic Magazine* for May 1817.

a pressure of more than a few pounds per square inch. Hence it was, that, although her boiler was rent, in consequence of a defect in the workmanship, nobody suffered by the accident. The alarm led the engineer erroneously to stop the engine ; but the captain ordered him to let it go on ; when, the fire being slackened, and the condenser in operation, the water soon ceased to leak out. It is possible, in fact, for an engine to go, when the pressure is inadequate to resist that of the atmosphere, so that, on puncturing the boiler, the air would rush in, instead of the steam's rushing out.

If high steam is to be resorted to, however, there is a very simple mode by which the danger of explosion might be obviated. There are but two ways, in which such consequences can arise, where a boiler is provided with a proper safety-valve. One is, by overloading the valve, in consequence of unduly estimating the strength of the boiler ;—the other, by some indiscreet or malicious interference, which impedes the freedom of its action. In order to provide against the first, let the strength of the boiler, in every boat, be proved periodically, by a pressure at least ten pounds more than it is intended to use in practice :—to provide against the second, let there be an additional safety-valve, secured in a case, so as to be inaccessible to every one but the captain ; who ought to be obligated not to load it higher than within ten pounds of the point, to which the boiler may have been proved,

[In September, eighteen hundred and sixteen, the late Gouverneur Morris, Esq. delivered an inaugural discourse before the New-York Historical Society. He concluded his address with the passages which we subjoin. They deserve to be preserved as an evidence of the genius of the respected and lamented author, as a just tribute to the memory of those whose names he mentions, and as a memorial of the project which inspired such eloquence.]

“ By the occasion which called us together, we are reminded that Hudson discovered, in one thousand six hundred and nine, the river which bears his name. Imagine his amazement, had some prophetic spirit revealed that this island would, in two centuries from the first European settlement, embrace a population of twice fifty thousand souls.

“ Europe witnessed, in eight years, four events which had great influence on the condition of mankind. The race of English monarchs expired with Elizabeth in one thousand six hundred and three. Henry the Fourth of France was assassinated in one thousand six hundred and ten. In the same year the Moors were expelled from Spain. And, in the next, Gustavus Adolphus became king of Sweden. These events excited, as they

ought, much attention. But the discovery of Hudson's River, within the same period, was of such trivial estimation as to occupy no space in public annals.

"O man! how short thy sight. To pierce the cloud which overhangs futurity, how feeble. But why be surprised that European statesmen, two centuries ago, were indifferent to what passed on the savage coast of America; when, at the same time, the existence of Russia was unnoticed and almost unknown.

"Little more than a century has elapsed since the decisive victory of Pultowa introduced the empire of the Czars to the society of European nations; an empire which stretched out from Germany to Kamschatska, from the Black Sea to the Frozen Ocean, contains a greater extent than was ever traversed by the Roman eagle in its boldest flight. That vast empire, so lately known, and so little understood, resisted, unshaken, the shock of embattled Europe, poured the rapid current of conquest back from the ruins of Moscow to the walls of Paris, and stands a proud arbiter of human destiny.

"A mission of no common sort was lately about to proceed from the New World to the Old. From that which in one thousand six hundred was a dreary wilderness, to that which in one thousand seven hundred was a cold morass. It was contemplated that a vessel of novel invention, leaving this harbour, should display American

genius and hardihood in the port of St. Petersburg. If this expedition be suspended or laid aside, it is not from any doubt as to its practicability.

“There are persons of some eminence, in Europe, who look contemptuously at our country, in the persuasion that all creatures, not excepting man, degenerate here. They triumphantly call on us to exhibit a list of our scholars, poets, heroes, and statesmen. Be this the care of posterity. But admitting we had no proud names to show, is it reasonable to make such heavy demand on so recent a people. Could the culture of science be expected from those who, in cultivating the earth, were obliged, while they held a plough in one hand, to grasp a sword in the other? Let those who depreciate their brethren of the West, remember that our forests, though widely spread, gave no academic shade,

“In the century succeeding Hudson’s voyage, the great poets of England flourished, while we were compelled to earn our daily bread by our daily labour. The ground, therefore, was occupied before we had leisure to make our approach. The various chords of our mother tongue have, long since, been touched to all their tones by minstrels, beneath whose master-hand it has resounded every sound, from the roar of thunder, rolling along the vault of Heaven, to the “lascivious pleatings of a lute.” British genius and taste have, already, given to all “the

ideal forms that imagination can body forth," a "local habitation and a name." Nothing then remains, for the present age, but to repeat their just thoughts in their pure style. Those who, on either side of the Atlantic, are too proud to perform this plagiary task, must convey false thoughts, in the old classic diction, or clothe in frippery phrase the correct conceptions of their predecessors. Poetry is the splendid effect of genius moulding into language a barbarous dialect. When the great bards have written, the language is formed; and by those who succeed it is disfigured. The reason is evident. New authors would write something new, when there is nothing new. All which they can do, therefore, is to fill new moulds with old metal, and exhibit novelty of expressions, since they cannot produce novelty of thought. But these novel expressions must vary from that elegance and force in which the power and harmony of language have been already displayed.

"Let us not, then, attempt to marshal, against each other, infernal and celestial spirits, to describe the various seasons, to condense divine and moral truth in mellifluent verse, or to imitate, in our native speech, the melody of ancient song. Other paths remain to be trodden, other fields to be cultivated, other regions to be explored. The fertile earth is not yet wholly peopled. The raging ocean is not yet quite subdued. If the learned leisure of European wealth can gain applause or emolument for meting out, by syllables reluctantly drawn together, un-

harmonious hexameters, far be it from us to rival the manufacture. Be it ours to boast that the first vessel successfully propelled by steam was launched on the bosom of Hudson's River. It was here that American genius, seizing the arm of European science, bent to the purpose of our favourite parent art the wildest and most devouring element.

"The patron—the inventor are no more. But the names of Livingston and of Fulton, dear to fame, shall be engraven on a monument sacred to the benefactors of mankind. There generations yet unborn shall read,

"Godfrey taught seamen to interrogate,
 With steady gaze, though tempest-tost, the sun,
 And from his beam true oracle obtain.
 Franklin, dread thunder-bolts, with daring hand.
 Seized, and averted their destructive stroke
 From the protected dwellings of mankind.
 Fulton by flame compell'd the angry sea,
 To vapour rarified, his bark to drive
 In triumph proud thro' the loud sounding surge.

"This invention is spreading fast in the civilized world; and though excluded as yet from Russia, will, ere long, be extended to that vast empire. A bird hatched on the Hudson will soon people the floods of the Wolga, and cygnets descended from an American swan glide along the surface of the Caspian Sea. Then the hoary genius of Asia, high throned on the peaks of Caucasus, his moist eye glistening while it glances over the ruins of

Babylon, Persepolis, Jerusalem, and Palmyra, shall bow with grateful reverence to the inventive spirit of this western world.

“Hail Columbia! child of science, parent of useful arts; dear country, hail! Be it thine to meliorate the condition of man. Too many thrones have been reared by arms, cemented by blood, and reduced again to dust by the sanguinary conflict of arms. Let mankind enjoy at last the consolatory spectacle of thy throne, built by industry on the basis of peace and sheltered under the wings of justice. May it be secured by a pious obedience to that divine will, which prescribes the moral orbit of empire with the same precision that his wisdom and power have displayed, in whirling millions of planets round millions of suns through the vastness of infinite space.”

[The following is an extract from a Discourse delivered before the American Academy of the Arts, by his Excellency DE WITT CLINTON, the present Governor of this State. Though the work of which it forms a part, may preserve the memory of Fulton beyond the period to which this volume may extend his fame, yet it is believed so just and elegant a character from the pen of so distinguished a writer, will not be unacceptable in this place.]

"Fortunately for the interests of mankind, Mr. Livingston became acquainted with Robert Fulton, a self-created great man, who has risen into distinguished usefulness, and into exalted eminence, by the energies of his own genius, unsupported by extrinsic advantages.

"Mr. Fulton had directed the whole force of his mind to mathematical learning and mechanical philosophy. Plans of defence against maritime invasion and of sub-aquatic navigation had occupied his reflections. During the late war he was the Archimedes of his country.

"The poet was considered under the influence of a disordered imagination when he exclaimed,

" Soon shall thy arm, unconquer'd steam! afar
 " Drag the slow barge or drive the rapid ear,
 " Or on wide-waving wings expanded bear
 " The flying chariot through the fields of air."

* Darwin.

"The connexion between Livingston and Fulton realized, to a great degree, the vision of the poet. All former experiments had failed, and the genius of Fulton, aided and fostered by the public spirit, and discernment of Livingston, created one of the greatest accommodations for the benefit of mankind. These illustrious men will be considered, through all time, as the benefactors of the world—they will be emphatically hailed as the Castor and Pollux of antiquity—*lucida sidera*—stars of excellent light and of most benign influence.

"Mr. Fulton was personally well known to most who hear me. To those who were favoured with the high communion of his superior mind, I need not expatiate on the wonderful vivacity, activity, comprehension and clearness of his intellectual faculties: and while he was meditating plans of mighty import for his future fame and his country's good, he was cut down in the prime of his life and in the midst of his usefulness. Like the self-burning tree of Gambia, he was destroyed by the fire of his own genius and the never-ceasing activity of a vigorous mind. And O! may we not humbly hope that his immortal spirit, disembodied from its material incumbrance, has taken its flight to the world of pure intellect, "where the wicked cease from troubling, and where the weary are at rest."

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